Pit and Quarry

SAND-GRAVEL-STONE
CEMENT-LIME-GYPSUM

Pit and Quarry

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Vol. 12 CHICAGO, ILL., SEPTEMBER 15, 1926 No. 12

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SOUND ECONOMIC REMEDY NEEDED FOR BUSINESS CYCLES

AUTHORITIES on the problems and vicissitudes of business refer to the business cycle as something which is unavoidable. The facts seem to warrant this conclusion. Alternating periods of so-called good and hard times have recurred with such regularity that an assumption that they are inevitable is logical. A scientist arrives at a law by the inductive process of accumulating innumerable instances of the working of the principles which lead to the final assumption which is the law. The business cycle has been accepted on the same theory. It has operated so consistently for generations that it is considered as certain as the great laws of nature. There is a fallacy, however, in the logic which accepts these fluctuations of business as necessary. There is a crest to a wave, but there is no necessity for a crest of prosperity. There is a law of polarity in nature; a positive and a negative, north and south, ebb and flow of tides. But to assume that there is such a law operating in business is admission of a weakness. The fact that times of prosperity have been followed by times of depression does not establish a law. The business cycle is the result of lack of scientific handling of business. It is as logical to assume that hard times are necessary to counteract good times as it is to believe that a period of illness must follow a period of health; or that mental lethargy must alternate with intellectual activity.

Periods of financial depression are business illnesses and should be accepted as such. They are as unnecessary as physical ailments. There are certain types of individuals who are on the verge of a breakdown from extreme fatigue just before a vacation period begins. If they change occupations or for some reason are deprived of a vacation, they do not feel the need of rest so acutely. The fatigue was largely a mental condition reacting on the nervous system. The vacation is a fine thing but is not as essential to the body as to the spirits of the individual. Business depressions should be dealt with scientifically rather than sentimentally just as disease is handled in accordance with the most advanced knowledge of medical science. If a man has enjoyed health for a period of ten years, he does not insist that a period of illness is approaching. No law of opposites governs health in that way. In fact, a long period of health prepares the way for a permanent condition of health. A long period of prosperity would likewise prepare for a permanent period of prosperity if the best thought of business men could be applied to the problem.

Business conditions ought to be dependent on scientific operation of business. Our resources are unequalled by any country of the world; our ingenuity and skill are sufficient for any undertaking; our capacity for work is almost unlimited. We should, therefore, apply these sources of power to the problem of fluctuations of prosperity. In other fields there is evidence of enormous progress. Medical science is waging an endless battle with disease. In the realm of electricity progress is so great that we are almost breathless with wonder at the speed with which we are advancing. We are forging ahead in mechanical achievement with unbelievable rapidity. There is, in fact, no field of science or engineering in which progress is not so great and so vital as to merit our respect and amazement. We cannot continue to accept as inevitable this instability of business conditions. We must determine the cause for the disease and apply a sound economic remedy.

There are two small parts of the world where the great manufacturing centers are found; northwestern Europe, and northeastern United States. Eighty-eight per cent of the population of the earth depends on about twelve per cent for large scale production. Of course, manufacturing on a smaller scale is carried on in various places the world over, but surplus production is limited to certain industrial centers. For a world of 1,800,000,000 persons large scale production is carried on by 250,000,000 persons. Besides contributing on so large a scale to the industrial output of the world the United States has untold possibilities in agricultural production, in the non-metallic mineral industries, and in output of other minerals. Our resources have barely been touched in comparison with what the future offers. It seems incredible to the rational thinker that this instability of market conditions, this periodic epidemic of feverish financial depression cannot be controlled. There is every reason to hope that the business cycle can be analyzed so thoroughly and scientifically that it will cease to exist before many more decades have elapsed. Parallel with our great strides in production must come a steadiness of supply and

demand, and an eliminating of alternating peaks and depressions.

The solution of any problem requires the efforts of many minds. Concentration of the thought of a great many of those vitally concerned is necessary if there is to be significant attainment. Many scientists were studying along the same line when Darwin gave voice to their ideas. Fulton, Stevenson, Bell, and others did not think alone but represented the culmination of a great mass of investigation and research. Economists and business men are now studying this problem of the business cycle hoping to reach the solution, to discover the method of predicting the future trend of business and of forestalling periods of undue depression. All of the experience and wisdom of the world of business is needed to cope with the problem. No executive can afford to remain indifferent to the subject. Times of prosperity tend to produce an attitude of indifference; yet only during such times can anything of value be done. Every leader in his own group may well devote time and thought to the possibility of rendering business conditions stable.

A study of international trade and its effect on national trade is valuable in the problem of fluctuations in business. Trading in both northern and southern hemispheres tends to stabilize conditions. Seasons are opposite; climates and crops differ widely; people have diversified tastes and customs; and a market exists somewhere for every commodity produced. A local condition can have little effect on industry if the range of market is large. Exchange of trade with European markets also tends to eliminate prolonged periods of depression. Such trade is to national trade what national trade is to local. The local dealer serves an area within a radius of a hundred miles. He is dependent on weather, crops, labor, and numerous other local conditions. The national distributor has fewer hazards. International trade, if properly regulated, functions without these seasonal and local handicaps and is valuable to business as a whole. The future will undoubtedly bring a great increase of international business for which we must be prepared. Heretofore we have blundered along with no very definite trade policy. Fifty years from now our trade figures will have increased three or four-fold. We can no longer think in terms of local conditions. We need well trained, clear thinking business leaders who know the mechanics of international business.

American business men can solve the problem of the business cycle. Instead of a cycle they can bring into existence a business spiral. The various forces which disrupt stable business conditions can be controlled. Supply and demand can be governed; markets can be understood and rendered dependable; waste and ineffectual methods can be eliminated. It is possible to apply scientific knowledge to every phase of business. Every producer, every executive should consider this problem of business fluctuation his problem. All the intellectual power, all the experience, all the resourcefulness in the world of industry should be concentrated on the causes of the business cycle, the remedies for these periodic occurrences of depression, and the best method of applying the remedies for the ultimate benefit of the largest number of industries.

CUTTING PRICES IS A QUESTIONABLE PLAN

CONFIDENCE is the main spring of business. If confidence is replaced by suspicion, the fundamental quality of business integrity has been lost. Cutting prices or selling on flexible discounts is a sure way of undermining business confidence. No producer can afford to indulge in the habit of "shading" prices. The practice is unethical and in the long run unprofitable. The buyer is certain to regard the producer with suspicion. He will wonder if the producer is not selling to his competitor at a still lower figure. Where there is no fixed price, there is no wholesome feeling of satisfaction over the deal. Fraudulent discount sheets are not a legal misdemeanor; there is no argument against them except on the basis of ethics, good judgment, sound business sense, and self respect. These principles of good business, however, cannot be ignored. Better to lose money than to lose one's good standing among customers and competitors. If prices are not right, they should be made right; but they should be adhered to under all circumstances.

Cutting prices may be a relic of the old days of barter. Contesting prices, securing merchandise for the lowest possible price, beating some one at the game of bargaining were ordinary occurrences a few generations ago. We are beyond that method of buying and selling now and are transacting business with greater dignity and integrity. No reputable producer in the non-metallic metal industries today wishes to lose the respect and confidence of his customers. His business is founded on sound laws of supply and demand. He operates on a scientific basis, sells according to established and known prices and holds a place of dignity and influence in the industry. He does not deal with lying prices nor employ cut throat methods. A sensible business man will guard his reputation with his customers as carefully as with his friends. If all men considered their own self respect, there would be little need for many of our laws. If business men pursued a policy of cut-price tactics, legislative action would be certain to follow. Government interference ought not to be made necessary.

MOHAWK LIMESTONE COMPANY ADDS NEW UNITS TO PRODUCE VARIETY OF PRODUCTS

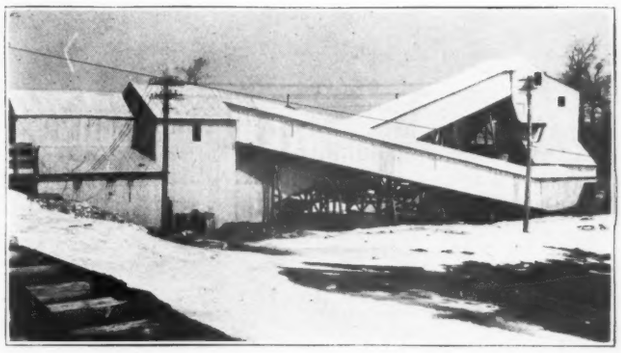
By F. A. Westbrook

ABOUT a year ago the Mohawk Limestone Products Company started construction on a limestone operation at Jordanville, New York, which began to produce about May 1st. The company intends to manufacture a variety of limestone products, as its name implies, but up to the present time only crushed limestone for road work has been sold. By this fall the kilns will be ready. The plant is located near the interurban trolley line of the Southern New York Railway Company, between Herkimer and Oneonta. A spur has been built out to it.

Mr. Ellis Soper of New York has been retained as consulting engineer for the erection of this plant. The superintendent on the job is Mr. O. W. Finch, who not only runs the part of the plant now producing but also supervises the rather extensive construction work now in progress. The plant as a whole is in two parts; the stone plant, including the quarry, crushing and screening equipment, and the lime plant. The latter includes the rotary kiln, hydrators and tube mill for making agricultural ground limestone.

Quarry

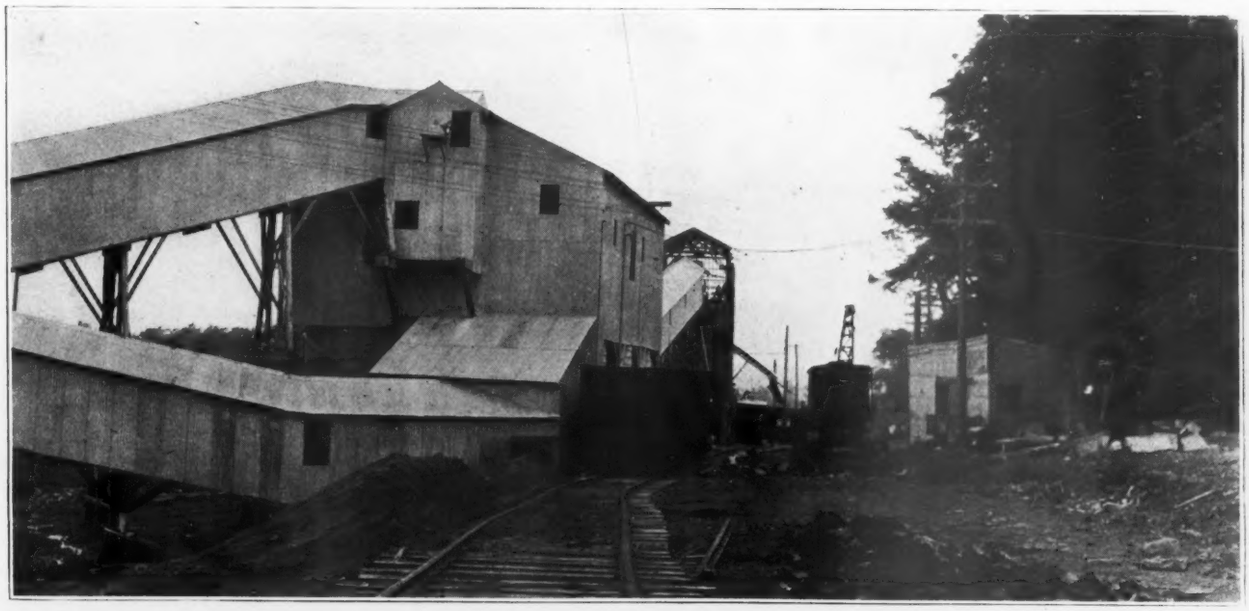
The floor of the quarry is kept at the same level as the platform from which the cars are dumped into the primary crushers, which is, of course, an important practical operating detail. It is possible because the limestone occurs in a ridge above this level. The rock is of a very fine grade of dark fossiliferous limestone. It is quarried by occasional large blasts by which something like 40,000 tons



Conveyor from Crushers to Screening Plant and Return

are thrown down at a time. Twenty-four holes have been drilled approximately 25 feet back from the face and spaced 14 feet apart. They are 60 feet deep. These holes are to be loaded with 300 tons of dynamite of which 60 per cent is Atlas dynamite at the bottom and the balance of the depth is to be filled with 40 per cent dynamite. The drill holes being 5⅝ inches in diameter, the 5 by 16 inch cartridges are a very convenient size.

The deep holes are drilled with Sanderson Cyclone well drills. Where points or projections have to be drilled and where the depth does not exceed 22 feet, two Wood rock tripod drills are used. For breaking up large blocks there are two Ingersoll-Rand B C 340 jack hammers. Air is supplied for these and for the Ingersoll-Rand Leyner number 33 drill sharpener by a 12 by 12 Ingersoll-Rand compressor.



View of Screening Plant Showing Conveyor from the Crushers, Return Conveyor and the Conveyor to the Lime Plant in the Background. Also Freight Car Dumping Load Into Hopper Under Tracks.

Drill at Top of Quarry

Stone is loaded onto the dump cars by a number 37 Marion electric shovel equipped with a 1¾ yard bucket. The side dump cars, which have been rebuilt by the company, are hauled over standard gauge track to the primary crusher by old trolley cars. Steam locomotives are about to be substituted because the overhead trolley contact wire is not wholly satisfactory in view of the fact that it is frequently knocked down by blasts.

Crushing Plant

The various parts of the crushing and screening plant, including conveyors ,are housed in wooden framed structures sheathed with 22 gauge galvanized corrugated iron made by the Newport Rolling Mills. In fact, 2,000 squares of this material have been used on this job. Allis-Chalmers electrical equipment has been used throughout this part of the plant as is also the case with the other parts. An interesting feature of the electrical installation is that the motor controls have been centralized at two points; one at the screen house, and the second at the crusher house. At the latter point there is a master control switch by means of which all motors driving crushing and screening machinery as well as the associated conveyors can be stopped. All wiring is in conduit throughout the plant. United States Rubber Company belts are used for all power transmission. For the crushing machinery, these belts are joined with Crescent fasteners but for the other drives with Bristol fasteners.

The primary crusher is a 30 inch Superior McCully gyratory. A Webster pan conveyor takes the stone from this to the two secondary crushers which are 12 inch Superior McCully gyratory crushers. These crushers discharge into a 30 inch conveyor, 130 feet between centers, which takes the crushed stone to the screen. Dodge conveyor equipment is used everywhere in this operation, and it is provided in each case with Quaker City belts which are joined with Bristol belt fasteners. This particular conveyor delivers the crushed stone to an Allis-Chalmers screen which is 30 feet long and 5 feet in diameter. Five grades of material

Electric Shovel Loading Dump Cars in Quarry

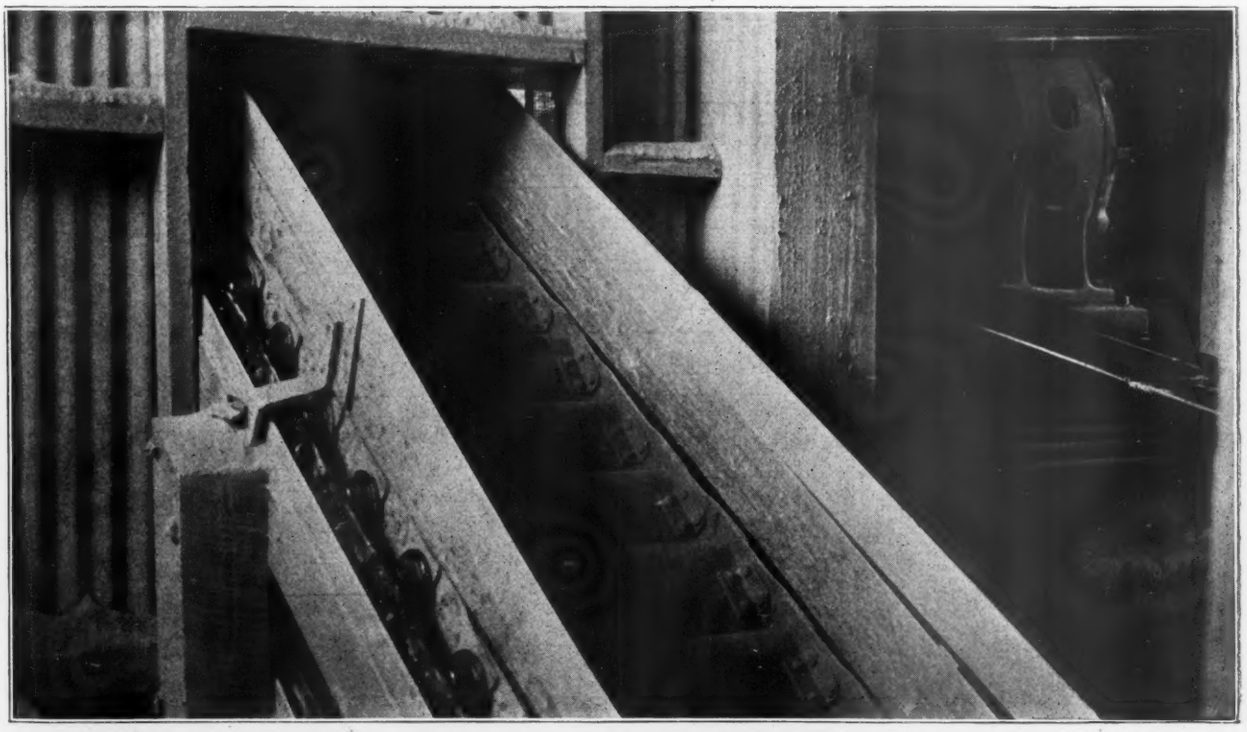
are sorted out by this screen. The first series of openings are 3/16 inch in size, which let through the dust, and these are followed by 5/8 inch, 1¼ inch and 2¼ inch openings which allow the number 1, 2 and 3 sizes, respectively, to pass. The number 4 size comes from the tailings. Each size is of course dropped into its proper bin. There is an elevator in the bin for the number 1 size which takes it to a small rotary screen for rescreening. There is a large demand for it for road work in the vicinity of Jordanville, and 40,000 tons have been sold so far this year.

The means for handling the contents of these bins is unusual and ingenious. In the first place, they are located adjacent to the railroad tracks so that freight cars may be loaded directly from spouts. In addition to this there are two lines of conveyors from under them into either of which any of the bins may be discharged. One is a return conveyor and the other goes to the lime plant. The return conveyor consists of a 24 inch belt 134 feet between centers, used for several different purposes. It can return any of the larger sizes from the bins to the secondary crushers or a Jeffrey hammermill which is located adjacent to the secondary crushers. This is useful if there is a large demand for the smaller sizes, as is frequently the case for road work. It is also expected that large quantities of fine stone or dust will be used for making pebble lime, which commands a high market price. The return conveyor can also be made to discharge into the conveyor leading from the secondary crushers to the screens so that if desirable the contents of any bin may be rescreened.

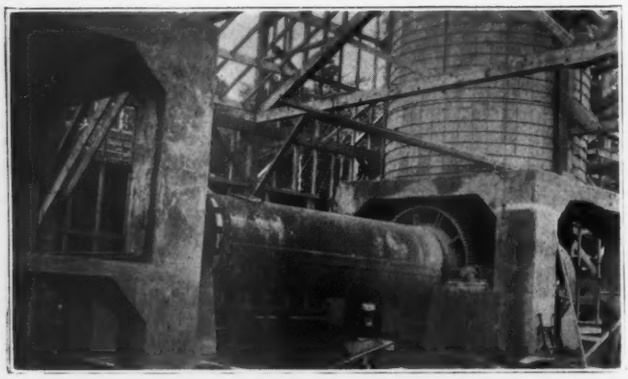
Freight Cars Loading at Concrete Storage Bins. Drag Washer May Be Seen on Top of Bins at Right of Screen

Portable Loader in Storage Piles

There is still another feature to this return conveyor which greatly facilitates the handling of material. This is an additional short conveyor which carries material from a hopper under the railroad track to the return conveyor and thence to the secondary crusher, the hammer mill or the conveyor leading to the screen. The particular



Pan Conveyor From Primary Crusher to Secondary Crusher.



Tube Mill in Lime Plant

reason for having this is that provision is being made for a large outdoor storage yard, which will be described later, and it will undoubtedly be necessary from time to time to transport the larger sizes from this storage bank to the crushing plant for reduction. This, as will be seen, can most easily be done in cars which can then be dumped into the hopper under the tracks which feed into the short belt leading to the return conveyor.

The second belt conveyor leading from under the bins, which is the one to the lime plant, is 212 feet long and 24 inches wide. It has been said that this carries material to the top of a bin at the lime plant. It may go in three different directions from this point. Although the actual installing of machinery for this has not been completed, as will be seen from some of the photographs, it is progressing rapidly and the plans have all been made. A description of the layout as decided upon is therefore not out of place. Mr. Finch has this part of the plant now so well organized that he can run it with four men.

Storage Yard

In the first place there will be a conveyor 100 feet between centers and 24 inches wide from the first bin at the lime plant to the outdoor storage yard, across the railroad track. This is designed to hold about 40,000 tons of rock. The yard will be under a craneway 350 feet long. The 100 foot conveyor will discharge into another 24 inch wide conveyor equipped with a traveling tripper at right angles to it and extending the full length of the craneway. The material will thus be stored in piles of various sizes and a Lorraine Steel Company electric crane equipped with a clamshell bucket will be installed to handle it. About one-quarter, or 80 feet, of the length of the craneway will be covered for the storage of material for the kilns.

In this way a large supply of stone can be accumulated for winter use, which is particularly necessary in this locality, where the snowfall is very great. The storage bins have purposely not been made very large in view of the ease with which freight cars can be loaded by the crane. This is accomplished by dumping the contents of the clamshell bucket into hoppers which discharge directly into the cars. It is now apparent that if any of the larger sizes in this yard need to be reduced it will not be difficult to load a car by means of the crane, haul it back about 200 to 500 feet to the hopper below the rails and discharge the load into the conveyor which will carry it back to the secondary crushers or hammer mill.

Lime Plant

The small sizes will be used in the lime plant. There is to be a screen over the bin at the entrance

One of The Long Conveyors in Housing

to this operation which will separate the fines into two sizes. The dust will go into one compartment in the bin and the buckwheat into the other compartment. Either one of these is to be carried by a 24 inch belt conveyor 70 feet between centers to the upper end of the rotary kilns and fed into them by an automatic feeding device.

There are to be three kilns made by the Vulcan Iron Works, 110 feet long by 8 feet in diameter and heated by pulverized coal. A building 160 feet by 60 feet is being erected to house them. It has a steel frame and is being sheathed with Newport Rolling Mill 22 gauge corrugated galvanized sheathing. The coal handling has been mechanicalized in keeping with the rest of the operation. It is dumped from a trestle under which there is to be a drag conveyor which will feed it to a Rex elevator on 46 foot centers. This deposits the coal in a bin from which it descends by gravity to an Aero pulverizer. From the latter the pulverized coal is blown into the kiln.

The hot lime issuing from the lower end of the kilns will be cooled by being carried over a cooler of the company's own design by means of a Link-Belt drag chain conveyor on 40 foot centers. The cooler consists of a long steel box kept cool by circulating water through it. After being cooled the burned lime is to be taken by a Rex elevator, built on 46 foot centers to a screen over the quick lime bin. The purpose of the screen is to take out overburned or improperly burned pieces. This waste material will be elevated (Rex elevators on 46 foot centers are to be used throughout) to a small overhead bin from which it can be taken to the dump.

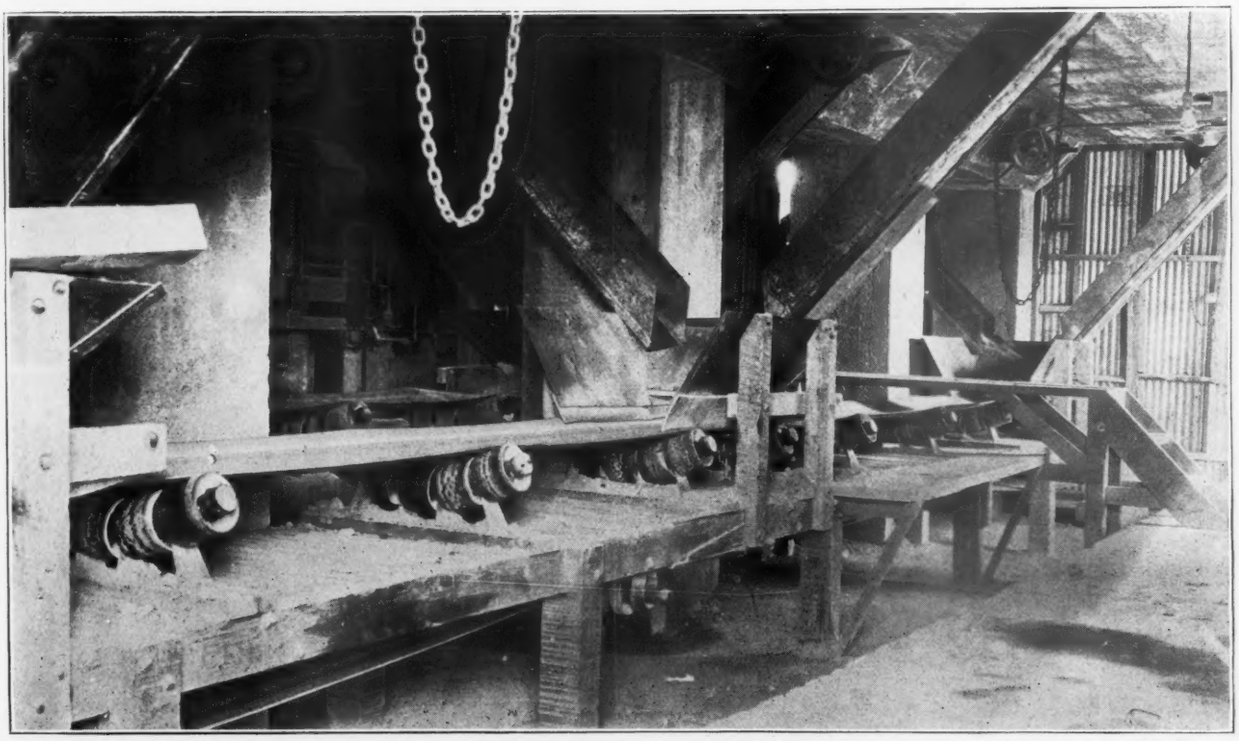
Rotary Kiln in Lime Plant

It is expected that the waste will be very small in amount. The good lime passing through the screen drops into the bin under it.

From here the quick lime is handled in either of two ways. It may be taken from the bottom of the bin by a 24 inch belt conveyor on 42 foot centers to the platform where it is loaded in bulk in freight cars. There is also to be an elevator discharging into two Clyde hydrators. These hydrators are placed high enough so that the hydrated lime will descend by gravity to a screen over the hydrated lime bins. The screen is simply to remove any improperly hydrated lumps. Under these bins there will be two 3-bag Bates packers. The capacity of the lime plant is estimated at 180 tons every 24 hours for each kiln.

Agricultural Limestone

The dust from the storage bin at the entrance to the lime plant is to be used in part for agricultural lime. It will be fed by screw conveyor into a number 14 Smidth tube mill for pulverizing. An-



Two Conveyors From Bins Which Are Described in Detail in the text.

other screw conveyor will take the pulverized material to a bucket elevator feeding a Sturtevant vibro screen over the storage bin. The fines will go into the bin and the overs will be returned to the tube mill. The capacity of the tube mill is 75 tons per day.

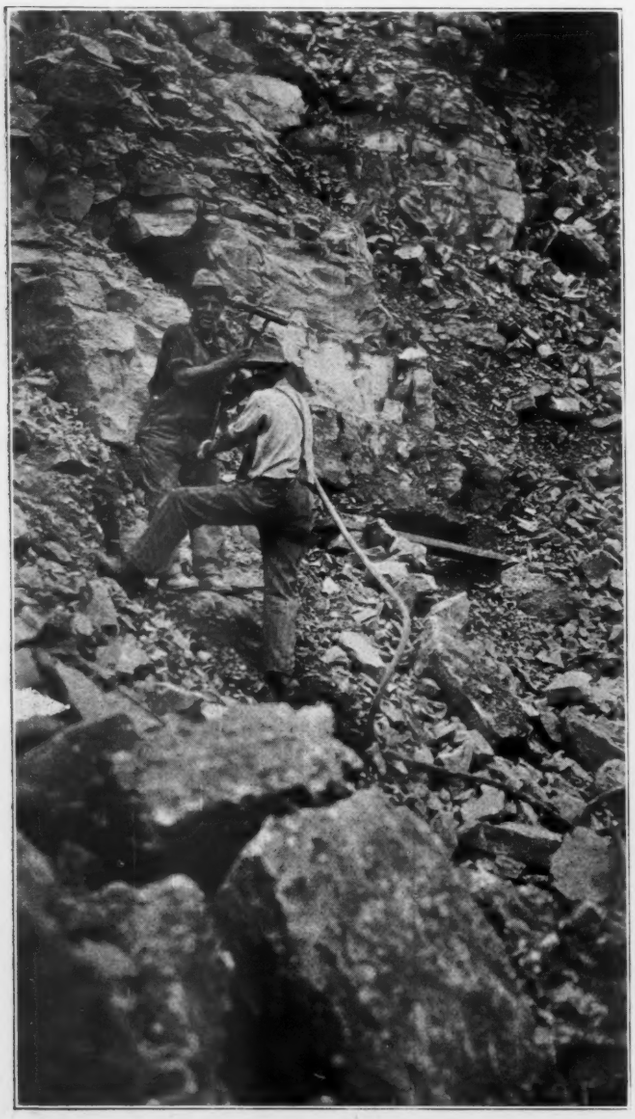
The building in which the machinery for making ground limestone is being installed is 180 feet by 60 feet. It is made with timber framework and metal sheathing as used for the other buildings.

General

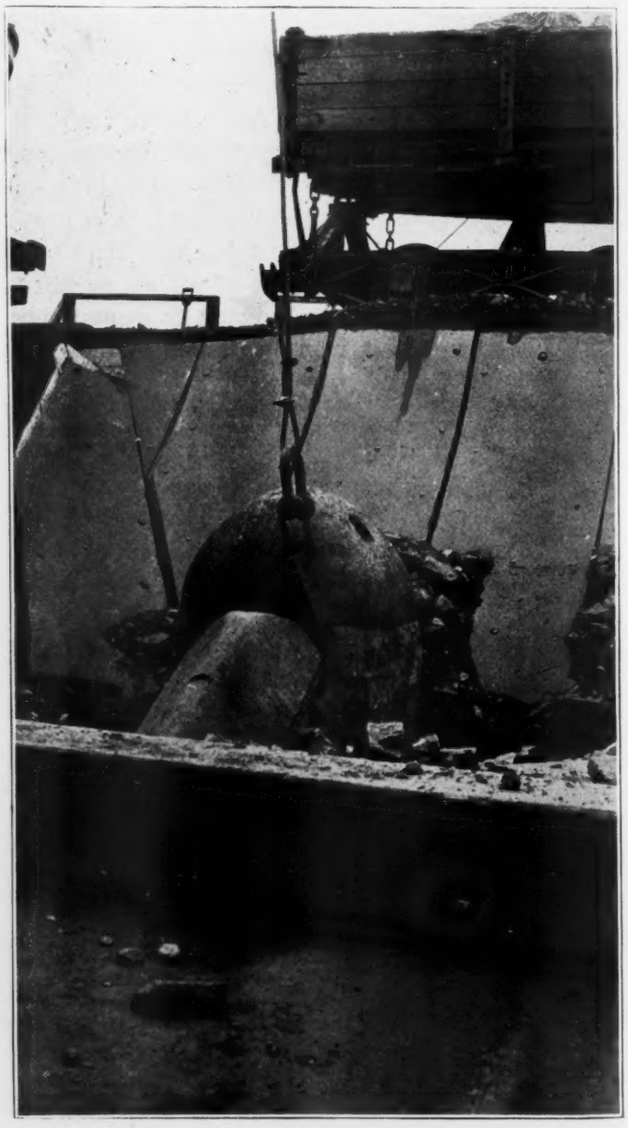
There are in all twelve feed and storage bins. These are 16 by 20 feet in size and are known as Crane concrete stave silos. The whole management of the company from the general manager down is very enthusiastic about them. They are extremely easy to erect, and three men can put up two in one day. They are also dustproof. It will also be noticed in the illustrations that they are placed on concrete piers raised well above the ground. Another general application is that all belt conveyors are Dodge and that all elevators are Rex, 46 feet in height. The latter are inclosed in shafts built of concrete tile, made at the plant of limestone and cement. In fact, the making of tile is to be one of the future activities of the company, and a Besser concrete tile machine has been purchased for this purpose. A very convenient piece of equipment being used is a Universal crane on a large Mack truck. It is provided with a clamshell bucket, which is proving very useful in connection with the construction of the new plant.

Management

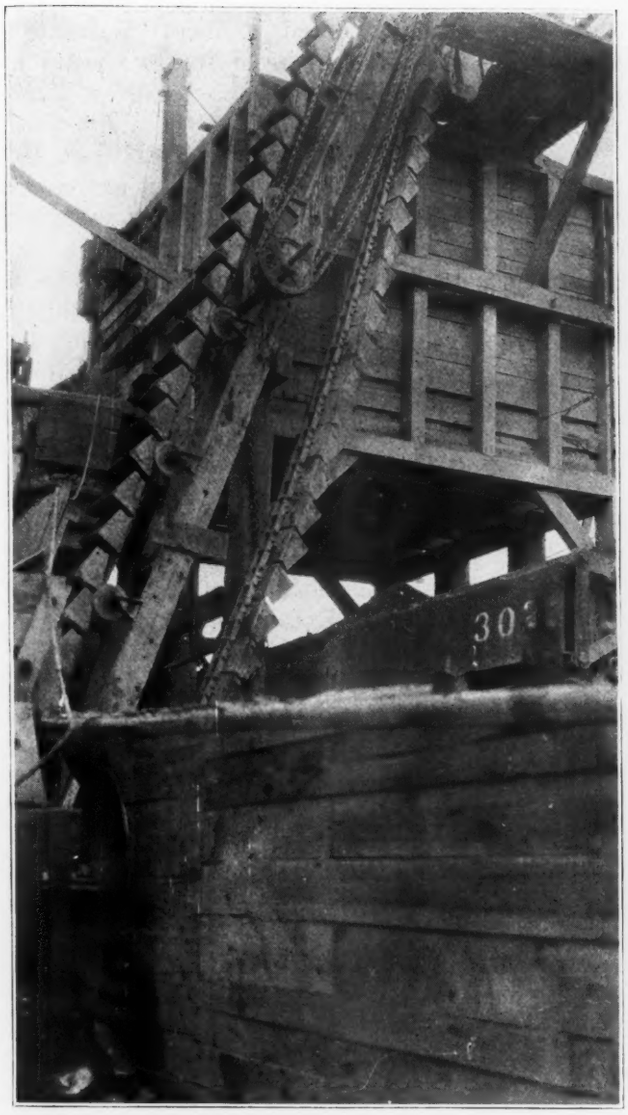
The Mohawk Limestone Products Company comprises two operations, the rather elaborate one at Jordanville, New York, just described, and a sand and gravel operation near the village of Laurens, New York, about 30 miles from Jordanville on the interurban trolley line to Oneonta. The company is managed by the J. G. White Management Corporation of New York City. L. A. Postum has just been appointed manager. He was formerly associated with the Hardinge Company and took part in that company's work of revamping one of



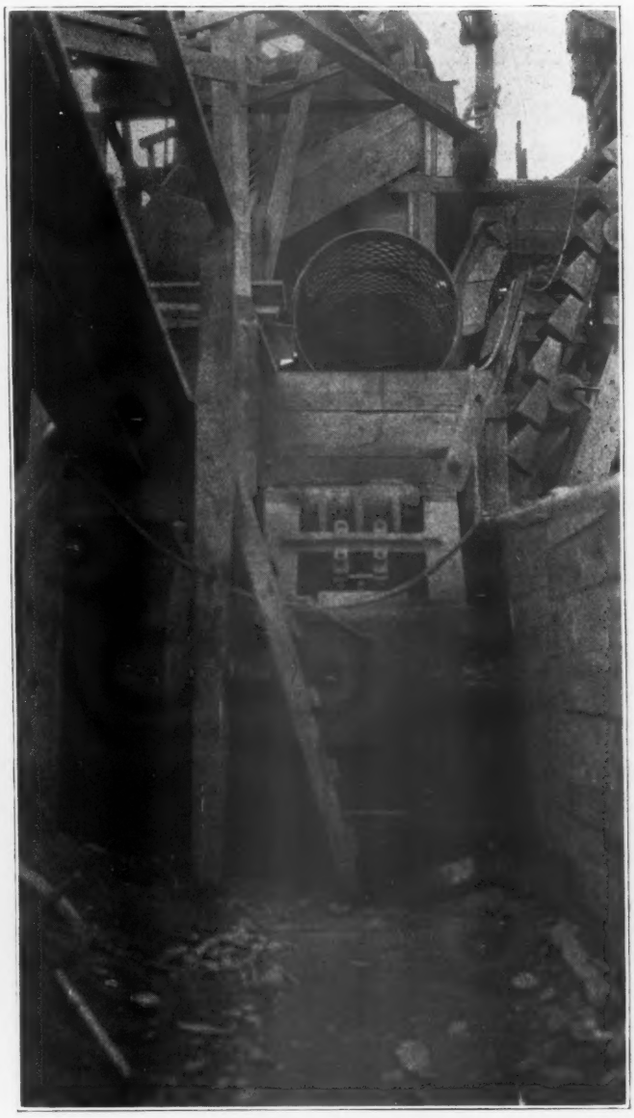
Drilling in the Quarry



Primary Crusher

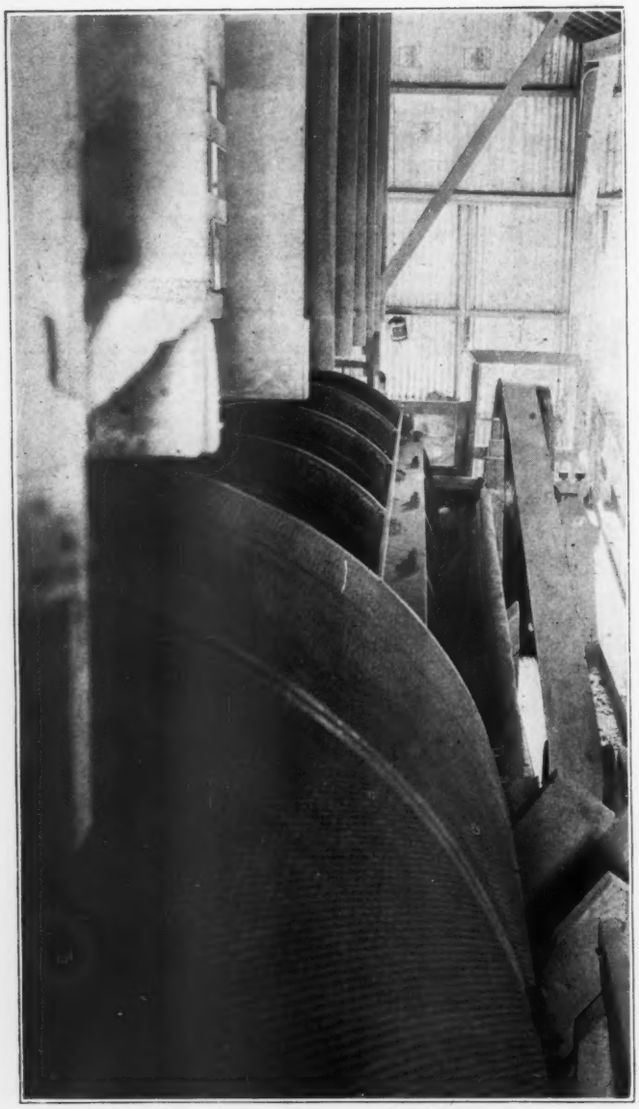


Elevator to Dry Screen. Secondary Crusher is at the Left Just Below the Wood Bin



Scalping Screen, Primary Crusher and Elevator to Dry Screens

Electric Shovel Loading Dump Car in Pit



View of One of the Sizing Screens

the Continental Portland Cement Company's plants. He was also employed for two years at the Acme Cement plant near Catskill, New York, which is now owned by the Continental Portland Cement Company. It is thus apparent that Mr. Postum brings with him an experience which should be very valuable in the successful operation of the lime kilns at Jordanville. Mr. Finch, the plant superintendent at Jordanville, is a practical man of long experience who is thoroughly familiar with the quarrying business.

Sand and Gravel Plant

This is a washing operation capable of producing something like eleven or twelve carloads of sand and gravel a day. The pit is located directly adjacent to an interurban trolley line, and the plant is situated close to the tracks, as shown in the illustration, so that the loading of freight cars is a very simple matter. Excavation is by means of a Thew electric shovel with a ¾ yard dipper bucket. The material is placed directly in a dump car, which is hauled up by a Lidgerwood hoist to a grizzly for dumping. The machinery is divided into two very definite sections which are connected by a 30 inch Dodge conveyor about 85 feet between centers. The sand and gravel which pass through the grizzly first go into an Acme scalping screen from which the troughs drop onto the conveyor. Overs from the grizzly and tailings from the scalping screen slip off into a Climax jaw crusher.

The crushed stone then goes through a dry screening process for the purpose of removing dust due to crushing before sending it onto the washing screen. A Jeffrey elevator has, therefore, been provided to raise the stone from the bottom of the

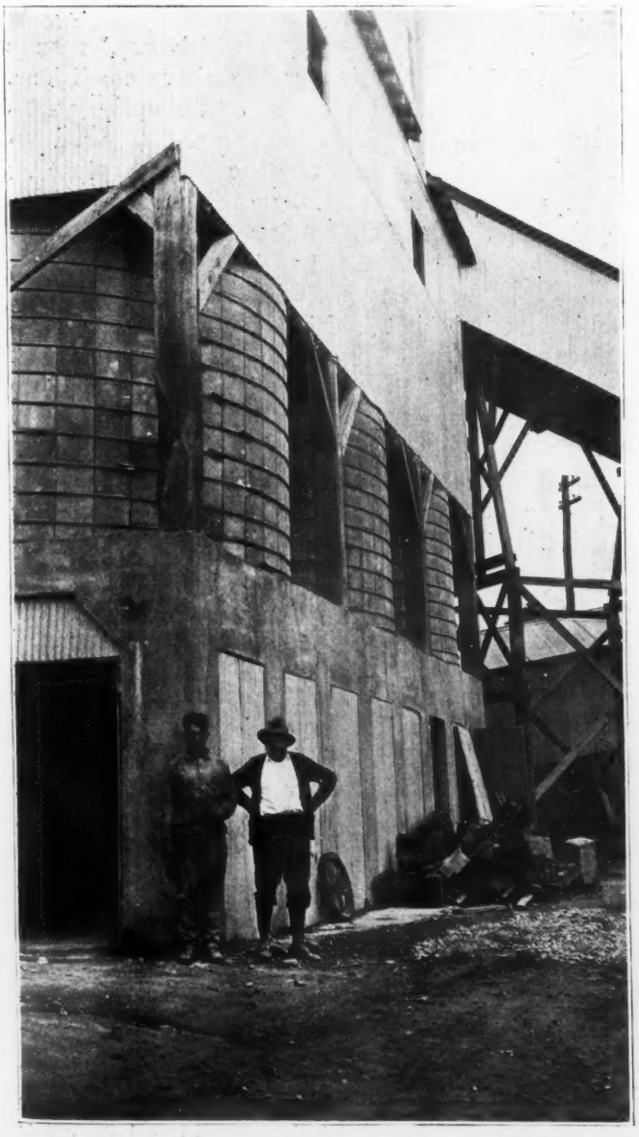
Incline from Quarry to Scalping Screen and Crusher

crusher to a rotary cylindrical screen made by the company. The dust is taken out at the upper end of this screen; the mixture of commercial sizes passes through the lower part of the screen to the Dodge conveyor and the oversizes or tailings drop to the Acme secondary crusher. The rock from this crusher is elevated to the screen again so that the dust may be removed and so that any pieces which are still oversize may be returned to the secondary crusher. There are bins under the dust screen in which it is collected and later drawn off and disposed of. There is practically no market for the dust in this locality, although there are other places where it is in demand for driveways and other purposes.

The mixture of commercial sizes of gravel and sand is taken by the Dodge conveyor to an American Road Machinery Company washing screen. This is a rotary cylindrical screen with a central perforated pipe which discharges numerous jets of water. It sorts out four sizes, namely, sand, number 1, number 2 and a mixture of number 3 and number 4 gravel, and each is dropped in its bin. However, the sand, before going to the storage bin, is washed in a Good Roads Machinery Company drag washer.

There are four storage bins, consisting of Crane concrete stave silos, as shown in the illustrations. In case the surplus accumulates in excess of the storage capacity of the bins, it is loaded into freight cars and dumped in piles along the track. A Robins loader is provided both for moving the piles back to a proper distance from the track and for reloading.

All operations are electrified. Both Westinghouse and General Electric Company motors are used. The equipment was installed under the supervision of O. W. Finch, who is now plant superintendent at Jordanville, before he undertook that job. The plant has been in operation long enough to have proved its worth. The output of this operation is sold mostly for road work, especially the sand, which is in great demand and which apparently cannot be overproduced.



Concrete Stave Bins. Mr. Finch the Superintendent, and His Son

Freight Cars Loading at Concrete Stave Bins

MATERIALS HANDLING AND QUARRY PRACTICE

By Walter H. Stephens

IN spite of all the wide open avenues for the dissemination of news and views of modern methods in all industries there are innumerable plants that still hold tenatiously to outgrown and unprofitable methods. A number of stone quarries have recently come under the writer's observation some of which are handling their material in just the same way as was done in grandfather's time except that perhaps a motor is used instead of a horse to wind up the hoist rope. Possibly the great stride from horse power to motor has seemed so great that any greater steps may seem too idealistic and doubtful to the satisfied operator.

Let it be understood to begin with that the writer is not a quarry man and knows little of quarry work. He does claim to know considerable about handling materials and knows more of that part of quarrying perhaps than most superintendents simply because of a long experience in observing materials handling methods not only in one industry but in a great many. Stone quarries, however, are no worse than many other lines of work when it comes to unprofitable handling methods.

As an example let me tell of a large granite quarry with which I am familiar. This quarry started as a hill, some 50 feet above the surrounding ground level and now after about 25 years of successful operation it has become a tremendous hole 140 feet deep. The plant is managed by one of the best superintendents I ever knew on any work. This fact together with its 25 years of success in operation might seem to refute my points before they are made. But let us see.

The stone is drilled and blasted out of ledges on the working faces and blown and broken to crusher size on the quarry bed or floor. That's undoubtedly good quarry practice, but from there on the handling of the stone is open to question. There are six derricks on the upper ground level each with an engineer and a signalman. Under each derrick are six to eight men to break up the stone and load boxes to go to the crusher. The loaded boxes are hoisted to the ground level and there dumped into quarry cars to be carried to the crusher.

When a box is being loaded with its two tons of rock, the derrick is mostly idle. When ready to hoist there is considerable lost motion in getting the signal man and engineer signalled into action, the signals going through three men. There is more lost motion in getting started straight, and during all this time as well as during the period of hoisting, and until the box goes over the top the entire crew stands "clear" doing nothing. Several minutes elapse when the box starts back, work is suspended and the entire crew stands "clear" (idle) again.

Old quarrymen are all familiar with this process no doubt as it seems to be so common as to be almost standard practice. Yet the old timer will recognize the operation as the same his grandfather used some 50 years ago except with a horse instead of a motor to do the hoisting.

Of course the motor or engine is a great deal faster than the old horse power and it may be satisfactory to some superintendents, but it is not the modern efficient method that makes the margin of profit worth while. There are too many handlings between the initial point and the destination. All labor units involved stand idle from ¼ to ½ the time and interruptions cut down the balance of their working time. The labor cost to bring the stone from quarry floor to quarry car on the ground level is from 50 cents to 70 cents per ton. It should be less than 10 cents per ton. There are 10 operations where 5 should suffice.

There are several ways in which good results may be obtained to remedy the above conditions. In any case either the boxes or the quarry cars should be eliminated so that there may be no handling necessary between the point of loading and its discharge. Then by centralizing or concentrating the hoisting work a more efficient unit may be used, the necessity of six crews standing clear for from two to six minutes every half hour would be eliminated, and but one or two engineers being needed instead of six. The hoisting unit might be one of the mine hoist type, or a large conveyor, or possibly an esculator to carry up quarry cars. The mine type hoist appeals to me as having the greatest possibilities in this case.

None of the changes suggested are any but the application of ordinary materials handling principles such as are being applied successfully in almost every industry. No "original" or freak ideas are contemplated, none are needed. On the other hand, as is usually the case where materials handling equipment is used, the savings would be tremendous, and might easily be the salvation of the plant in these days of diminishing labor supply and demands for higher wages. If for instance, there is the saving of 50 cents per ton in labor cost, and I know that is conservative, the total savings on a production of 300 to 400 tons per day would be enough to justify considerable investment.

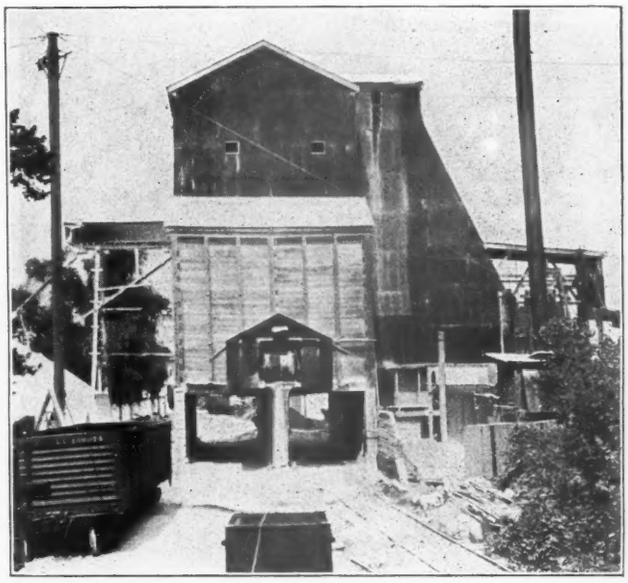
The Bureau of Public Roads is going to forecast the number of motor cars which may be expected to use the roads of New Hampshire and Vermont several years hence. It will do this from data collected in an investigation now being made in cooperation with the highway departments of these states.

FLEXIBILITY AND LARGE PRODUCTIVE CAPACITY FEATURE THIS COMPANY'S OPERATIONS

By E. D. Roberts

THIRTEEN may be considered an unlucky number in the estimation of some people, but not to Mr. F. W. Stolle, president of the Casper Stolle Quarry and Construction Company, East St. Louis, Illinois, who are now constructing their thirteenth crusher plant at a station on the Terminal Railroad of St. Louis, called Falling Springs, Illinois. This statement is not meant to convey the idea that this company is operating 13 crushing plants. This company has been in existence for 35 years, but due to the needs for greater or more economical production, and in some instances loss by fire, 13 plants have been built by this company during these years. Three producing plants are now in operation.

The history of this company goes back to the pioneer days of crushed stone production in this section. In 1882, the Vandalia Railroad opened up a quarry at what is now known as Falling Springs and on the same property now being operated by the Casper Stolle Company. However, their operations were on a high level and were soon discontinued. In the same year Mr. Casper Stolle installed a No. 3 Gates crusher at Stolle, Illinois, on the old St. Louis and Cairo Short Line, producing ballast for this railroad. When this railroad was taken over by the Illinois Central, an increased demand had to be met due to the large mileage to be served. Thirty-five years ago the quarry was taken over by Casper Stolle's son, Mr. F. W. Stolle, who incorporated it as the Casper Stolle Quarry and Construction Company, in honor of his father. At that time the company was actively engaged in construction work around East St. Louis, which will explain why "construction" was used as part



One of the Crusher Buildings

View of the Quarry Showing Track Layout

of the company's name. Construction work has long since been discontinued by this company, although there has been no change in the name.

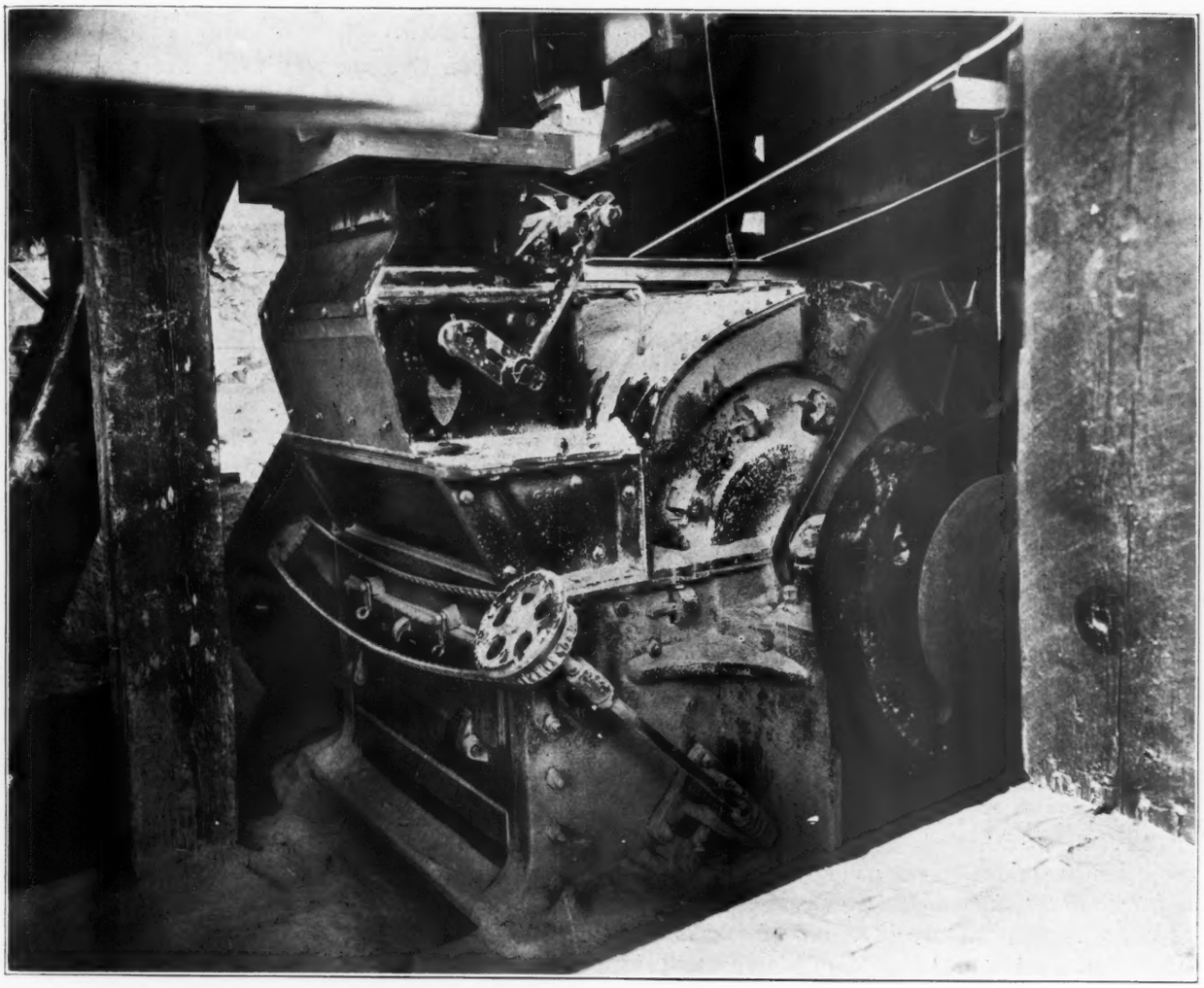
During these thirty-five years there has been a remarkable growth in this territory, resulting in demands for greater output. This has been met by building new plants or rebuilding the old ones. In 1912 the plant was burned down, causing a $30,000 loss, with only $4,000 insurance. The plant was rebuilt from designs made by the Buckbee Engineering Company, Chicago. In 1922 the plant was remodeled to use electricity instead of steam as the operating medium. At the same time a new plant was built using an 8K Allis-Chalmers gyratory crusher with a No. 6 for rejects. Addition of a 50-B full revolving electric Bucyrus shovel was made last year to cut down the cost of quarry operation, and by keeping the older Bucyrus steam shovel in working order, with trackage to serve it, continued operation was assured. As a result of research work carried on by the extension department of the University of Illinois, it was found that land in southern Illinois needed the application of considerable lime to sweeten it and render it more productive. At first fine screenings from the crushed material were used for this agricultural limestone or agstone, but as the demand increased it was found necessary to install an American pulverizer to produce enough fine material for this purpose.

Discharging to Crusher

With the third plant in operation at Falling Springs, the Casper Stolle Quarry and Construction Company is in a good position to fill the increasing demands for agstone. While the plant is designed to produce this fine material, it is also producing concrete aggregates, road stone, ballast and riprap. This new plant is located about a mile south from the other two plants and this for a special reason. Material from the old plants had to pass over the Illinois Central tracks and was then conveyed by the Terminal Railroad of St. Louis into St. Louis. This switching charge increased cost per car over ten dollars the amount that was paid for freight by operators who were located on the Terminal Railroad. Therefore, this is the prime reason for not locating the new plant alongside the old ones or enlarging them.

Notwithstanding the freight rate difference this company has had to meet in order to compete in the St. Louis territory, they have furnished

Another Excellent View of the Quarry



The Pulverizer

A General View of the Quarry

crushed stone for many large buildings in St. Louis, among which are the Rice Stix, Lowe Theatre, Mayfair Hotel, Brown and Meredith buildings. This was possible due to the favorable trucking rates secured from several of the trucking firms of St. Louis, who were desirous of getting this business.

The demands made upon the company to meet increased production, however, have not made them forget the human side of their business, and this has also received attention. A large stone office, dormitory and eating quarters are maintained for the single men. Men with families are especially sought, and in order to keep them, homes are provided with a plot of ground, free coal, water and light. A recent addition of a four family flat has been made to provide comfortable quarters for those who prefer a city life type of residence. The aim has always been to encourage men to stay with the company and thus avoid losses due to a large labor turnover.

The Falling Springs Plant

This plant, constructed this year and put in operation this summer, is on the site of the pioneer crushed rock operations of the Vandalia Railroad, which started the production of crushed rock for ballast in 1882. The operations of the Vandalia Railroad were at a higher level, which removed all overburden from the present ledge, giving a 50 foot working face above the present working floor. This is high enough above the railroad track level to allow dumping of material from the quarry cars directly into railroad cars spotted under the approach to the crushing plant, when rush orders come from the railroad companies for riprap or quarry-run rock.

Sanderson Cyclone well drills are used to drill holes on 15 foot centers and 15 feet from the face. These holes are charged with Illinois Powder Company 40 per cent and shot with Cordeau-Bickford. Sullivan jackhammer drills using compressed air from a Pennsylvania air compressor are used to place holes in any large boulders which result from the shot. A small charge of powder reduces these boulders to the desired size.

An Erie full revolving steam shovel on tractor wheels, equipped with a ¾ yard bucket, places the rock in Easton 4 yard steel dump cars. These cars are the new type developed by the Easton Company and allow a better control when discharging the material with the improved type of door. This door is hinged to the bottom of the car and folds outward. This throws the material farther from the car than the old type, and if the car is overturned slowly it will hold as much of the material in the car as is required for a slow discharge. At the same time nothing hinders the discharge of any size of piece, as there is nothing above the discharge surface to interfere.

A 3½ ton Whitcomb gasoline locomotive handles the Easton cars to the crusher, where a Curtis air hoist overturns the car. The rock is discharged directly into a No. 7½ Allis-Chalmers gyratory crusher of the new type. The discharge from this crusher goes to a bucket elevator which carries the rock to the scalping screen located over the bins. This scalping screen is of the revolving type equipped with a dust jacket having ⅞ inch holes.

The Ground Storage System

The rock retained on the 7/8 inch screen and passing through the revolving screen is chuted to a bin below or can be graded further by placing the proper sized screens on the revolving frame. The rejects from the scalper are chuted to a No. 3 Gates crusher (which, by the way, is the crusher with which Casper Stolle started the production of crushed rock at Stolle, Illinois, in 1882), which discharges to the same bucket elevator serving the primary crusher. A gate placed in the chute to the No. 3 Gates allows the oversize rock to be diverted into a bin for use as flux stone.

Material passing the 7/8 inch dust jacket is elevated by a bucket elevator and discharged into another revolving screen placed alongside the scalping or primary screen. This second revolving screen is fitted with 3/16 inch mesh forged manganese steel screen cloth and retains the particles above 3/16 inch in size, producing 3/16 to 7/8 inch clean material for concrete aggregates. Material smaller than 3/16 inch is chuted into a bin below for use as agricultural limestone or agstone.

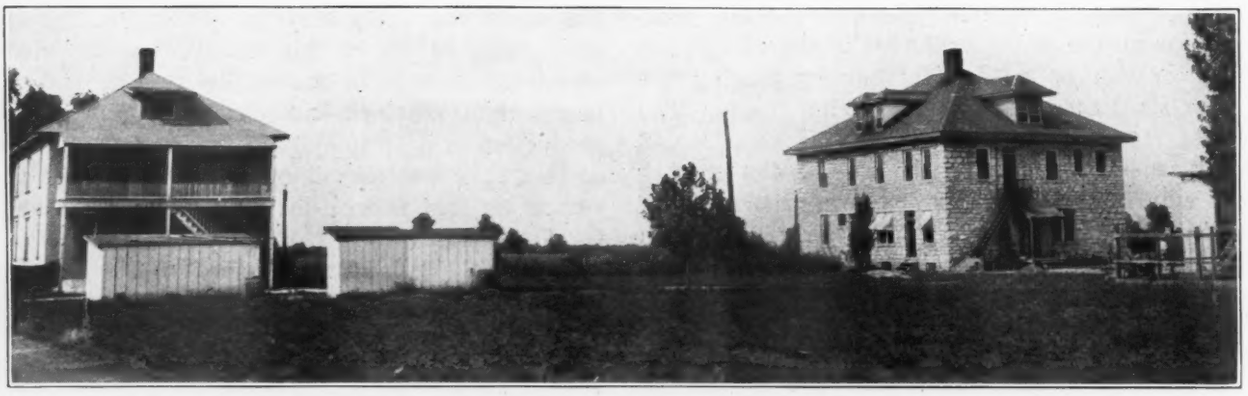
A Williams No. 7 Universal type pulverizer, located at the ground level with chutes leading to it from all bins, crushes any size of material to 1/8 inch and smaller for use as agstone. This machine produces 50 tons of pulverized limestone per hour and reduces it to a fineness of 55 per cent passing 100 mesh and 40 per cent passing 200 mesh. The pulverizer discharges into the boot of a Link-Belt elevator which carries the material to the top of the bin structure, discharging it into a chute leading to outside storage. A gate placed in this chute allows the diversion of material into an agstone bin under the sizing screens. Provision has also been made to divert this material to the sizing screen in case it is desired to rework material larger than 7/8 inch in order to obtain a larger production of 3/16 to 7/8 inch rock. Of course, to do this, it is necessary to open the rolls on the pulverizer so that it will not reduce the material to the fineness of agstone.

The discharge from the elevator carrying the fines from the Williams mill has been placed high enough to allow for the installation of a vibrating screen and yet have the rejects from the vibrator carried off by the present chute. This vibrating screen is used to produce fines for asphalt filler. Fairbanks-Morse slip ring, ball bearing motors are used to operate the various units throughout this plant. Bins have been placed over the shipping track, while side spouts allow cars on the track to be loaded direct from the bin by gravity. For its size this plant is remarkable for flexibility and quantity of production.

The Stolle Quarry

This quarry has been developed on two levels, the upper having a face 70 feet in height, while the lower has a 45 foot face. At present, operations are conducted only on the lower level, utilizing a new 50-B Bucyrus electric shovel to furnish the rock for both crushing plants. A No. 70 Bucyrus steam shovel is on the upper level with all trackage and is ready to produce stone in case it is necessary to shut down operations on the lower level. Water is removed from the pit by a Fairbanks-Morse centrifugal pump driven with a motor directly connected.

The New Quarry and Storage Unit



Apartment Building at Left for Married Men. Office and Bunk House at Right

Two Sanderson Cyclone well drills are used to put down holes for shooting rock ready for handling by the steam or electric shovels. The large boulders are drilled with Ingersoll-Rand jackhammer drills and broken up sufficiently for easy handling with the shovels. The quarry cars are of steel construction and designed by this company. The cars when loaded are moved to the foot of the incline by a Whitcomb gasoline locomotive. The large boulders in the car are then broken by bulldozing or mudcapping so that all material can remain in the car ready for taking to the crushers.

Each crusher plant has its own incline. These are so located that the Whitcomb locomotive can bring a string of empties from one incline and couple with a loaded string at the shovel. The loaded cars are pushed to the foot of the other incline, but the empties are dropped at the shovel ready for loading while the locomotive is taking the full cars away.

The inclines are operated by Allis-Chalmers hoists handling one car at a time. When the car reaches the top of the incline, it is dumped by a steel framework which raises the rear door and at the same time lifts the front end of the car. The incline serving the northerly plant is equipped with a concrete chute located just past the crusher. Therefore, by moving the steel framework which serves this hopper, railroad cars can be loaded with quarry run rock. Every spring there is an urgent call from the railroads for riprap material for use in repairing and preventing washouts to their tracks, and it was to satisfy this demand that the hopper was provided.

In the ordinary operation of the plants the material falls from the cars into No. 8 Allis-Chalmers gyratory crushers, one of which is an 8K and the other an 8D. The discharge from the crushers falls onto a belt which carries the rock and discharges it into a grizzly. The rock which is too large to pass through the grizzly falls into a No. 6D crusher and is discharged into a stone box leading to a bucket elevator. The material passing through the grizzly also falls into this same stone

Discharging into Crusher. Note the Concrete Hopper in Left Foreground For Loading Rip Rap

box, but is carried up to the sizing screens over the bins. The various sizes produced by the screens fall into bins below or are chuted to outside storage. The southerly plant is equipped with an American pulverizer which produces agstone. This is stored outside until the season for shipping arrives.

At the last named plant, a novel method is used for storing material outside. Due to the fact that the other plant can dispose of surplus production so easily, they have no outside storage. For the outside storage mentioned, a Flory double drum hoist is mounted on the platform built on a support located between the two tracks which serve the bins. A 4 yard car constructed by the Koppel Company is loaded with the surplus material from any bin and hauled over a trestle by a cable which leads back to the Flory hoist. This trestle is 900 feet long and 30 feet high, and the material is dumped from the car when it reaches a movable bumper which causes an automatic dumping device on the car to function.

An 18-B Bucyrus steam shovel on traction wheels is used to reclaim material from the various piles by loading it directly into railroad cars on tracks which run along each side of the storage area. A Stephens-Adamson car puller spots the cars for this service as well as when they are being loaded from the bins when no railroad engine is available. The agstone is reclaimed from the storage area directly into cars by a clamshell bucket operated by a Mundy hoist and stiff-leg derrick. When storing the various sizes in their different piles under the trestle, the toe of one pile sometimes mixes with that of another. To save rehandling this mixed material, a portable hammer mill has been provided which reduces the rock to a size suitable for agstone, discharging it onto a portable inclined conveyor. This discharges the agstone into a railroad car spotted on the track alongside.

As the crusher plants were originally run by steam engines, each is now operated by a large G. E. motor through Morse chain drives and belt reductions from these engines. The two crusher units produce an average of 1,400 tons of crushed stone per shift. Part of the year a large proportion is ballast stone, while a varied product is turned out during the remainder of the year. Material going out by trucks is weighed on a Howe platform scale located at the plant, while rail shipments are weighed by the railroad company.

The present officers of the Casper Stolle Quarry and Construction Company are F. W. Stolle, president and treasurer, and J. E. Weber, secretary. Mr. Weber has been with the company for over 26 years. The main office of the company is located in room 408, First National Bank Building, East St. Louis, Illinois.

Income Tax Reports Distributed

The total paid by the residents of each state in income taxes for the fiscal year ending June 30, 1926 is shown on an official statement which is issued by the U. S. Treasury Department. New York residents paid a total of $568,000,000, which is more than the residents of any other state paid. Pennsylanvia ranks second with a total income tax of $195,000,000. Illinois ranks third, with $177,000,000. Payments totaled more than $400,000,000 in four other states. These states were Massachusetts, $100,000,000; California $102,000,000; Ohio $109,000,000; and Michigan, $123,000,000.

Collections of income tax totaled $1,973,000,000 in round numbers. This was an increase of $211,000,000 for collections in the previous fiscal year, which ended June 30, 1925, when collections amounted to $1,762,000,000. Secretary of the Treasury Mellon argued that a rate reduction would bring in a larger revenue. Official totals show the extent by which this argument was proved correct. The income tax yielded nearly 70 per cent of receipts of the Federal Government during the fiscal year ending June 30, 1926. In addition to the income tax payments, the Government received $863,000,000 from miscellaneous taxes. Total collections from income tax plus miscellaneous taxes were $2,836,000,000.

Japan Making Extensive Plans For Road Building

Japan has practically completed plans for an extensive road building program which will involve an initial expenditure of $6,000,000 to cover ten years. A tremendous highway is to be built from Keelung, in the extreme north of the Island of Formosa, to Takso in the south, and from there east to Heito. There will be constructed 287 miles of highway, 21 large and 510 small bridges and 1,140 viaducts and culverts. The highway is to have a width of 48 feet, except in the mountainous regions where a 36 foot minimum is permissable. Another ten year period as well as additional appropriations will be necessary to fully complete the undertaking.

FACTS ABOUT BELT FASTENERS

By W. F. Shaphorst

ALL leather belts are already full of joints when they come from the manufacturer, but they are so well cemented that they are seldom thought of as being joints. In making a belt endless, the joint should be made in the same manner as the joints already put in by the manufacturer. If he cements and rivets, the user should cement and rivet. If he depends on cement alone, the user should be likewise.

In order that belts may do their best they must be pliable, laterally as well as longitudinally. On account of the cylindrical shape of the pulleys, the belt must be pliable longitudinally so that it can wrap itself intimately about the pulley. Because of the crown of the pulley, the belt must be pliable laterally. Intimate contact of the belt with the pulley is the secret of sliplessness. If the belt must be pliable, then for good service the joints must be equally pliable. The endless belt is therefore best because it is equally pliable in every direction. Among its other advantages are: its smoothness of running; the absence of noise; the smaller danger of slip and of running off the pulleys as compared with jointed belts; and the smaller danger of waves if the belt is slack.

The best laced joint is that one which most nearly approaches the cemented joint. The ordinary rawhide-laced joint will not give as high an efficiency, because the use of rawhide lacing requires that a considerable portion of the belt itself be cut away to make room for the lacing. If 20 per cent of the cross-section of the belt be removed for the lacing holes, the efficiency of the joint cannot in any event be higher than 80 per cent. Furthermore, rawhide joints are bulky. Also, they are stiff. As they pass over the pulley, they raise a portion of the belt on each side of the joint from the pulley face and thus destroy the much desired intimate contact of belt with pulley. Rawhide joints are noisy, they cause slip, and they are particularly undesirable for use on small pulleys. With large pulleys, the character of the lacing is not so important as regards bulkiness and stiffness.

Neither will the wire or metal fastener joint give an efficiency of 100 per cent. Some of the belt fibers are sure to be broken when the belt is pierced by the sharp metal teeth of the metal fastener or the punch for the wire lacing. The lost strength is not so great as it is in the case of the rawhide lacing. Compared with the rawhide joint, the wire lacing is almost ideal, from the standpoint of strength of joint. As regards pliability, metal lacings are continually growing better. Many makes are pliable both longitudinally and laterally. The hinge joint is a good example of a highly pliable joint in the longitudinal direction. It is not so pliable in the lateral direction, but still it is pliable enough for most drives.

The above arguments seem to favor the wire-laced or metal fastener joint. The flexible metal joint is also favored by the following analysis of the cost of belting. If the efficiency of the three types of joints which have been considered are taken as

	Per cent
Endless belt	100
Metal lacing or fastener	95
Rawhide lacing	80

the corresponding belt width for transmitting equal amounts of power will necessarily be as follows:

Endless belt	1	1.00	1
Metal	1	0.95	1.053
Rawhide lacing	1	0.80	1.25

For doing the same work, therefore, the relative cost of the belts with the three types of joints will be in proportion to the above figures. If endless belts will cost $1,000, then we will have to pay $1,053 for belts if we use metal lacing, and $1,250 if we use the rawhide joint.

While the belts with the cemented joints will cost $53 less than those with the metal lacing, it must be remembered that the cost of making the cemented joint is considerably higher than that of making the metal laced joint. If the belt is to be shortened at more or less greater intervals, as is often necessary, the facility with which this can be done with the metal laced joint renders it superior to the others as an all around proposition.

If in estimating the cost of belting for the plant at $5,000, it is probable the average manufacturer would base his estimate on belts using rawhide lacing at the joints. That is the way it has always been done. But as the rawhide joint has only 80 per cent efficiency, and as the metal laced joint has 95 per cent efficiency, we could by basing the estimate on the metal lacing find that the belting would cost only $5,000 x 1.053/1.250 $4,220.

Thus fasteners, usually considered a "small item," affect the result as much as $780 worth. As a rule belt costs are seldom figured in this way, but the process of reasoning just outlined shows that as a rule too little attention is given to the very important factor of belt lacing.

With the belt properly put up and the best type of joint in use, the next step is to see that the belt is kept in the best condition at all times. It must be kept from becoming hard and cracking, and must be made or kept waterproof. It must be kept from slipping; its useful life must be maintained as long as possible by relieving the initial tension

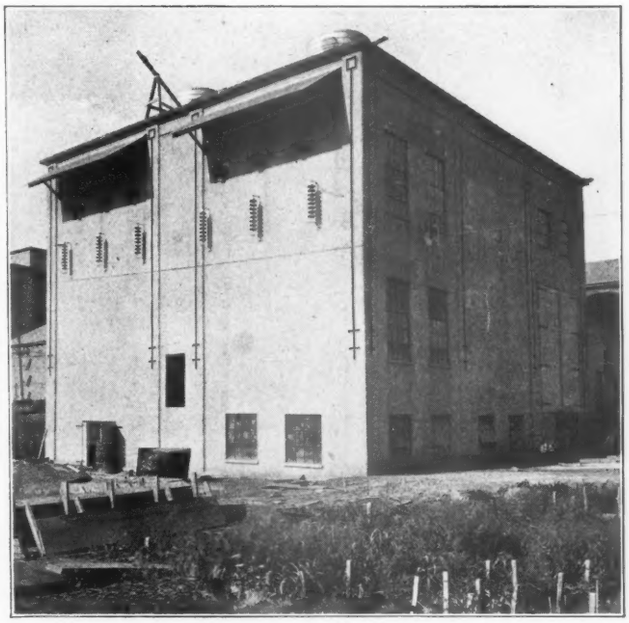
(*Continued on page 74*)

LAWRENCE PORTLAND CEMENT COMPANY MAKES MANY IMPROVEMENTS

By Charles A. Breskin

ONE of the oldest plants in the Lehigh Valley District, that of the Lawrence Portland Cement Company at Siegfried, Pennsylvania, has carried on considerable improvement work recently. In 1925 one group of 24 silos, a new packhouse and a bag house were constructed. This, in itself (increased the storage capacity by 236,000 barrels. Another group of 15 silos, in connection with the old packhouse increased the storage capacity by another 110,000 barrels. These two new units of storage silos coupled with the old stockhouses gives the present plant an effective storage capacity of approximately 550,000 barrels.

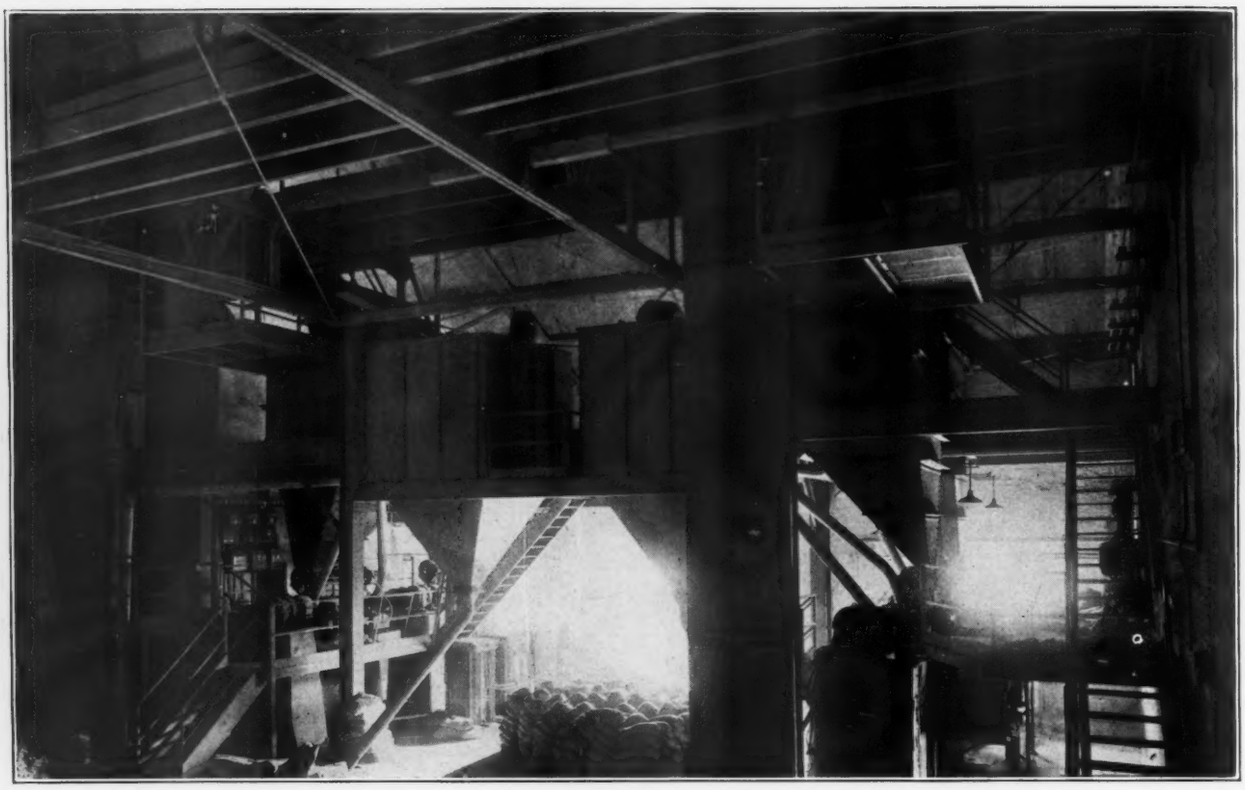
Before the new stockhouses were built, finished cement from the tube mills was conveyed to the stockhouse by screw conveyors and elevators. This method resulted in considerable leakage of cement with all its attendant dust. Also, in building the new silos, some system had to be evolved whereby the location of the buildings did not have to be governed by the method of getting cement into and out of storage. It was advisable to concentrate all the pulverizing equipment in one department, so as to reduce operating charges and standby equipment. In order to secure a location for the new silos and utilize the best available arrangement of railroad trackage and car handling facilities, one of the most complete Fuller-Kinyon conveying systems in the cement industry was installed. This not only improved the entire flow sheet of the mill but greatly simplified the layout of the silo storage units to suit conformation of the property. Reference to one of the accompanying sketches will illustrate the compactness of the entire system.



New Transformer House

At the Lawrence Portland Cement Company two grades of cement are manufactured—one, portland cement, sold under the trade-name, "Dragon"; the other, "Hy-Test," a mason's cement. The finish grinding department for both grades of cement are concentrated at one point. Clinker for portland cement is ground in a battery of nine

General View of the Lawrence Portland Cement Company's Oper ations at Siegfried, Pennsylvania

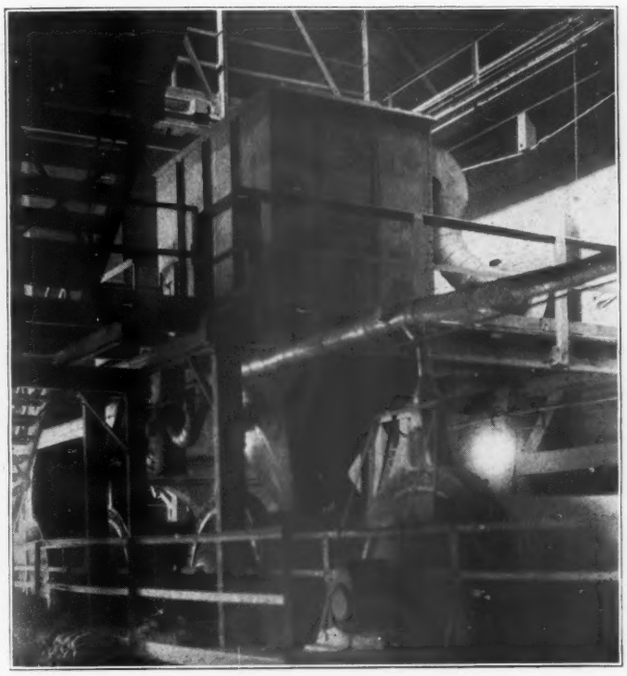


View Showing the Bagging Department. One Dust Collector Is Provided for Each Group of Two Packers.

Connection and Spouts from Packing Machines to Dust Collectors.

5 foot 6 inch by 22 foot Smidth tube mills. Each tube mill has a circular seal at the discharge end connected with a line running to one common header feeding a Paxson cloth screen type dust collector. The tube mills discharge to one section of 16-inch right hand screw conveyor and one similar left hand section. The discharge from both is at one common point and to a 16-inch screw running at right angles to the discharge from the tube mills. The cement is passed over a screen and then spouted to either of two 8-inch Fuller Kinyon pumps, each direct connected to a 150 h. p. Westinghouse motor. One of the two pumps serves as a standby unit. The pumps at this point are rated at 425 barrels an hour, pumping through a 5-inch transport line, but as high as 10,000 barrels per day has been handled by one pump.

The Fuller Kinyon system comprises the following essential parts; pump and direct connected motor, a blowout valve immediately beyond the pump and a pipe line to one or through branch lines to several destinations, switching valves at the branches, receiving bins at the point of destination, means for indicating condition of the bins to the operator and means for controlling the valves accordingly, which may be either manual or automatic. One of the longest pumping distance of the 5-inch line from the nine tube mills is 603 feet including a rise of 82 feet. This line extends over the group of 24 silos, arranged in two groups of



Close-Up View of One of the Dust Collectors on Battery of Tube Mills

12 each with a space of 10 feet between each group. This construction gives five interstice bins in each unit of 12 silos. The silos are 28 feet in diameter, 70 feet 3 inches high with an effective depth of 60 feet. The capacity of each silo is 9,500 barrels and the capacity of the interstice

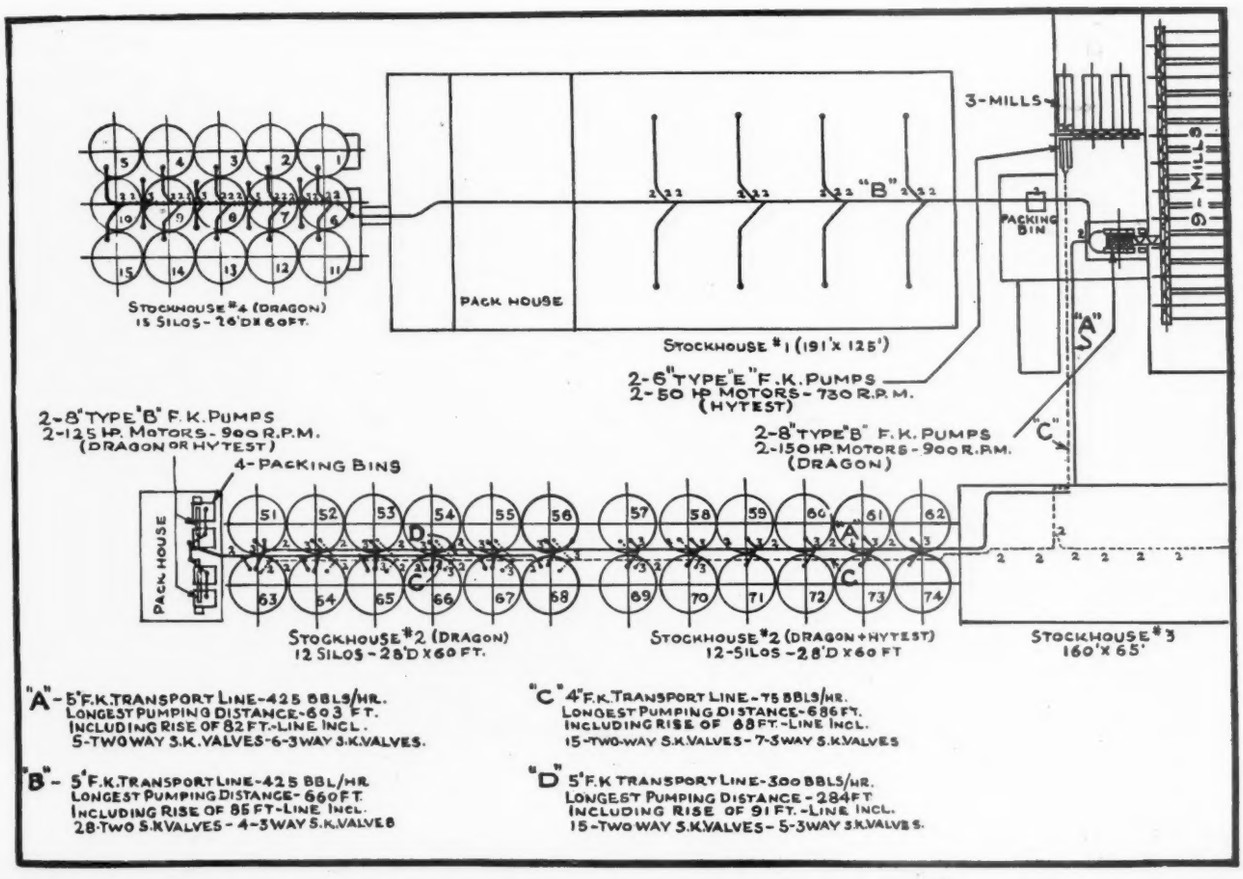
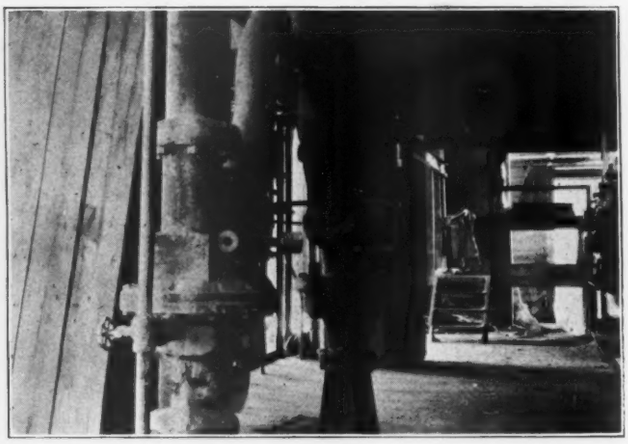


Figure 1. The Plan of Pump Lines for Both the Packing and Storage Departments. The Letters Denoting the Pump Lines Are Explained in the Article.



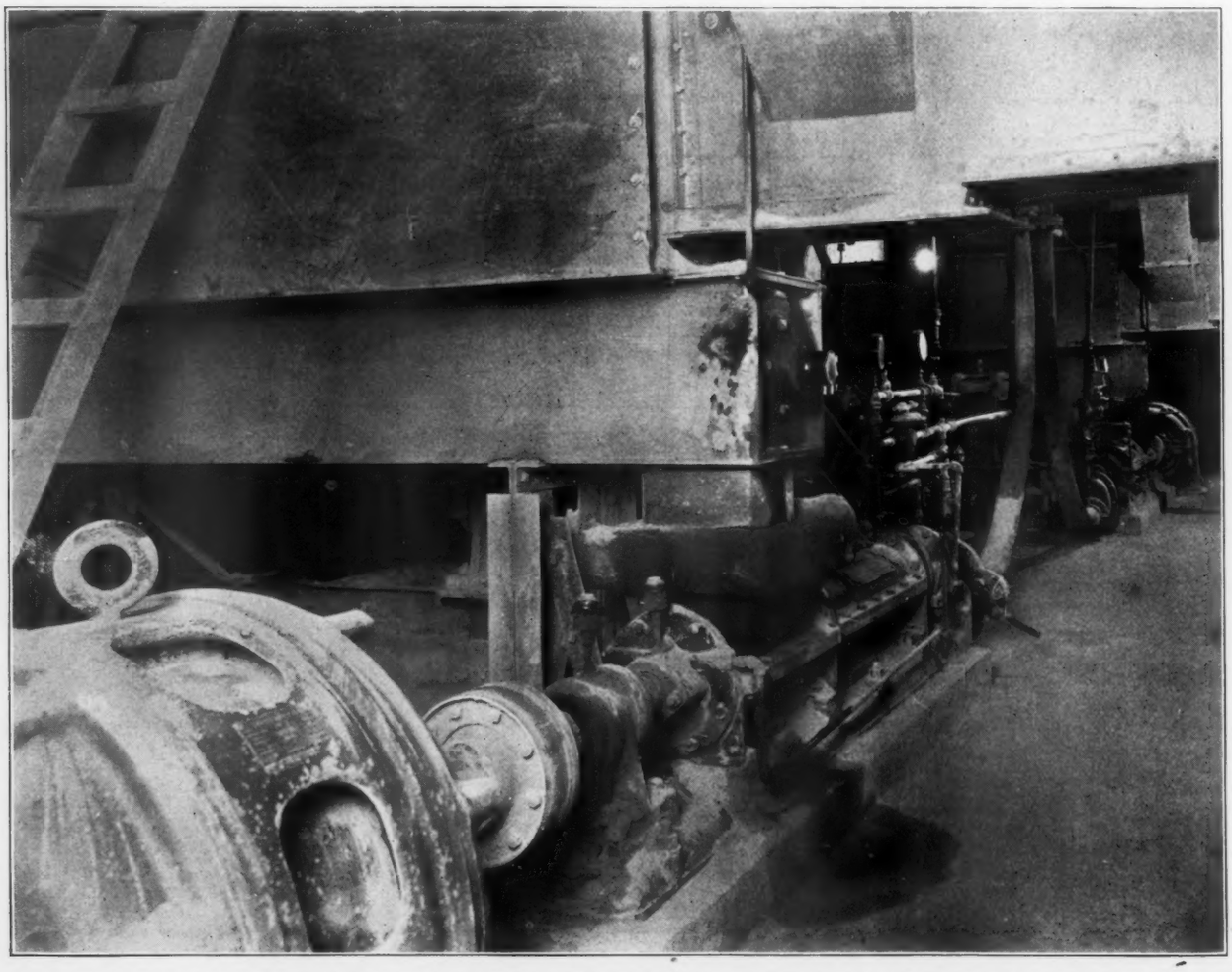
Valves and Portion of Transport Line from Pumps to Bins Over Packer

bins 1,800 barrels each. Discharge to the silos is through two and three way valves which are manually operated.

The discharge from the nine tube mills can also be diverted to stockhouses number 1 and number 4 through a 5-inch transport line extending 660 feet including a rise of 85 feet. Reference to figure 1 will disclose this as line B. This runs over the old stockhouse which is 191 by 125 feet and over a group of 15 silos, each 26 feet in diameter with an effective depth of 60 feet. The group of fifteen is so constructed as to provide 8 interstice bins.

"Hy-Test" cement is ground in a battery of three 5 foot 6 inch by 22 foot Smidth tube mills. The common discharge is to a screw conveyor feeding two 6-inch Fuller Kinyon pumps each direct connected to a 50 h. p. motor. This is line "C" in figure 1 and it handles 75 barrels of cement per hour through a 4-inch transport line. The longest pumping distance is 686 feet including a rise of 68 feet. This line extends over stockhouse number 2 and number 3.

Withdrawal of cement from the group of 24 silos is effected with screw conveyor which transfer the cement from the bins to a point in the basement of the packhouse where it is received by two 8-inch Fuller Kinyon pumps, each direct connected to a 125 h. p. motor. The pumping here is through a 5-inch transport line ("D" in figure 1) with a capacity of 300 barrels per hour. The longest pumping distance is 284 feet including a rise of 91 feet. The arrangement here is such that the pumps can handle both portland and "Hy-Test" cements and accommodate the packing or blending of either of these cements as desired to any selected packer machine. The packhouse serving the group of 24 silos consists of four Bates 3-



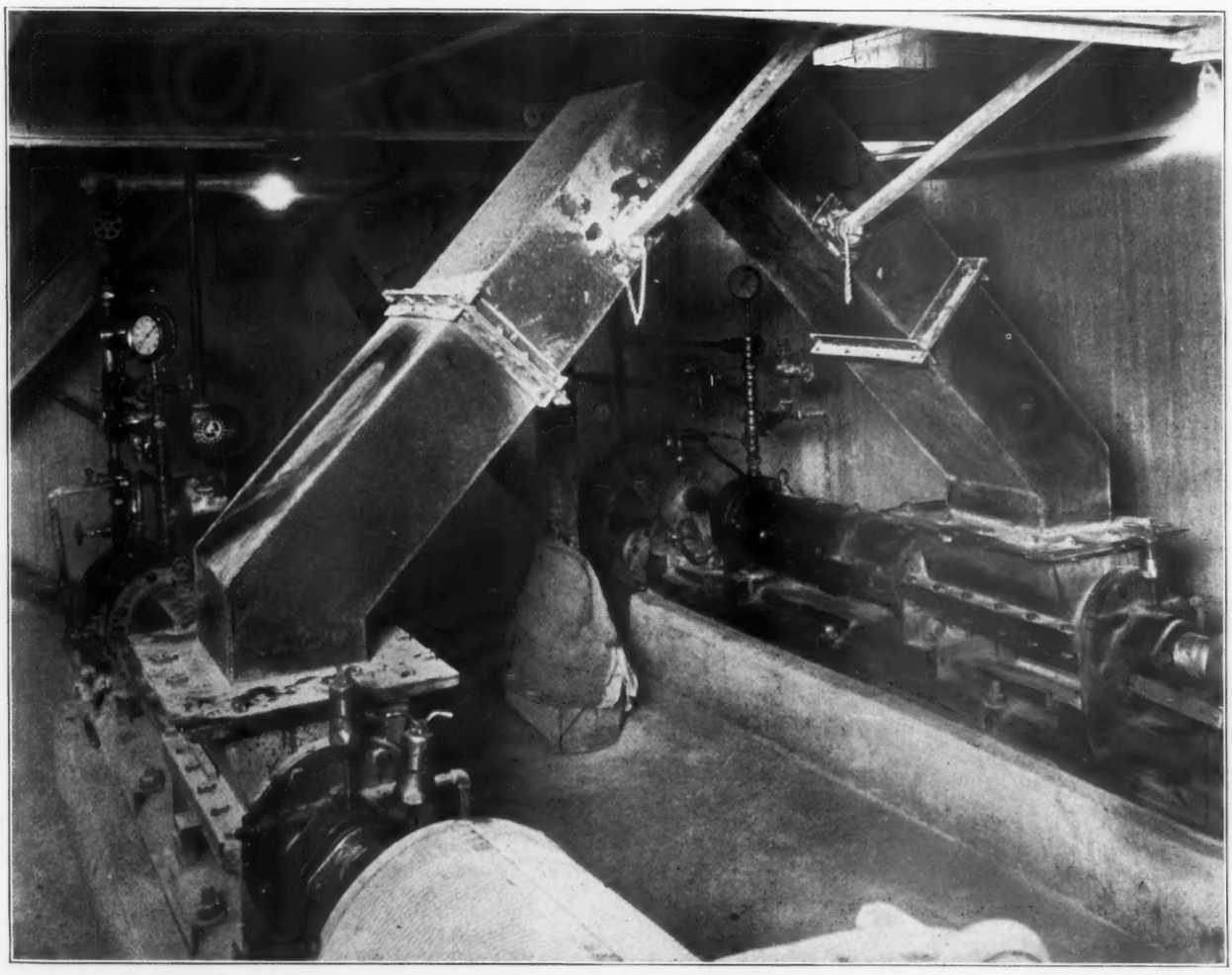
Two Pumps Direct Connected to 125 h. p. Motor. Unit Located in Basement of Packhouse Serving the 24 Silos

valve bagging machines, arranged two to a unit and each served by an individual bin. High or low level in the bins is indicated by bin indicators, which in turn throw mercoid switches. These switches open or close circuits connected to telltale lights mounted on a panel or control board located at the pump, so that the operator is at all times informed of the state of bins. The valves are operated pneumatically with solenoids and are actuated directly from the control board. This system is very simple and eliminates such inconveniences as bin overflow and shutdowns due to carelessness of the operator.

The bagging machines in the packhouse serving the 24 silos are connected to two Paxson dust collectors. In the packhouses serving the 15 silos and bulk stockhouse there are four groups of 3-valve Bates packers. There are two packers to each group, each of which is connected to a Paxson dust collector. At the time of the writer's visit the company was engaged in constructing four silos, each 31 feet 6 inches in diameter and 24 feet in height for "Hy-Test" cement. The location of the silos with reference to the pulverizing equipment is shown in figure 1. Underneath these silos will be a 6-inch Fuller Kinyon portable pump, which will be used for delivering the material from these silos to the receiving hopper for feeding to the tube mills. Delivery will be made at the rate of 200 barrels per hour through a 5-inch transport line. The longest pumping distance will be 233 feet including a rise of 60 feet.

Storage of the Bags for Packing

All of the new silos and packhouse, including the four being constructed now, were designed and built by the Burrell Engineering and Construction Company. The dust collectors, of which there are eleven in the plant, were furnished by the J. W. Paxson Company. The entire Fuller Kinyon con-



Pumps Each Connected to a 150 h.p. Motor. These Pumps Deliver the Output of Mine Tube Mills

Bags at Packer Ready for Use

veying system was designed by the Fuller Company and installed by the Burrell Engineering and Construction Company. The Lawrence Portland Cement Company has provided every facility to make conditions more workable for employees. Leakage of cement through transport has been eliminated with the Fuller Kinyon system. In the packing departments dust collectors have kept cement dust down to a minimum and as a result general cleanliness prevails. The improvements described above are the features in the renovation of the Lawrence. Another interesting improvement has been the paving of the entire plant during the last two years. New coal equipment has also been installed and additional kilns added.

Recent Progress in Technology of Slate

Rapid progress has been made recently in developing new and improved processes for the mining and manufacture of slate, states the Bureau of Mines, Department of Commerce, following a survey of the industry. Such changes in technology are indicative of the present tendency to place the industry on a better basis both as regards processes and products. Roofing slate which was formerly manufactured in small independent "shanties" is now produced in many places in large mills provided with power saws, traveling cranes and other labor saving devices. A pneumatic splitter has also been introduced to take the place of the ordinary chisel and mallet. A slate with lacquered surface in various colors and patterns has lately been placed on the market for sanitary uses, and heavy "architectural" roofing slates have come into greater prominence. Great progress has been made in studies of the physical and chemical properties of slates, the accumulated knowledge thus gained enabling the producers to direct each type of slate to its particular field, and thus constantly to provide more serviceable and dependable products.

Slate has been called "The sheltering stone" because one of its principal uses is for roofing, states Oliver Bowles, superintendent of the Non-Metallic Minerals Experiment Station of the Bureau of Mines, New Brunswick, N. J., in a report just published. Structures as humble in character as sheds and barns, those of imposing dimensions such as colleges, hospitals and churches, as well as all intermediate types of buildings, have found ample and enduring protection from the elements when properly roofed with this natural rock material, slate, which is peculiarly adapted for splitting into thin slabs. Other important uses are for electrical switchboards, school blackboards, and structural uses such as stair treads, floor tile and base boards.

Silica Sand Companies Merged

Announcement is made of the organization of The Higby-Reynolds Silica Company, which has taken over the business of The Higby Canyon Sand Company and The E. J. Reynolds Sand Company; these two companies being the largest operators in the production of silica sand in the Ottawa-Utica, Illinois district.

They will maintain separate equipment in each of the various sand strata, which will enable them to produce without the possibility of mixing the different grades, and supply highly bonded steel molding sand, furnace sand for furnace bottoms, core sand for malleable and gray iron castings as well as steel castings, welding sand for pipe mills, washed and dried sand for foundries, glass trade, and chemical industries; and sand blast sand for all purposes. By either separating the grades, or combining them, as may be desired, it will be possible to meet any individual specification that may be required.

These combined companies will have an output of sixty-five cars per day. These sands are shipped to all parts of the United States and Canada, for various uses. The names of the officers and addresses of the various officers are:

T. V. Taylor, president, Columbus, Ohio; A. S. Hindman, vice-president, 749 Railway Exchange, Chicago, Ill.; H. C. Cary, vice-president, Utica, Ill.; C. J. Niesen, secretary, Utica, Ill.; E. W. Weaver, general manager, Ottawa, Ill.

(Continued from page 68)

whenever possible or by making initial tension unnecessary. A good belt dressing is an essential to these conditions. A belt dressing that temporarily prevents the belt from slipping is not necessarily a good dressing. While it may stop the slipping, it may contain ingredients that will be as helpful to the belt as a treatment with sulphuric acid.

The best advice that can be given regarding belt dressings is: Investigate. Apply the information to the belts in your own shop. Use belts that require little or no dressing. The condition under which any two belts work are seldom alike, so that it is difficult to give exact figures. But the same kind of logic applies to all belt drives, and in every case the little things and small details will be found to be just as important as the big detail of first cost.

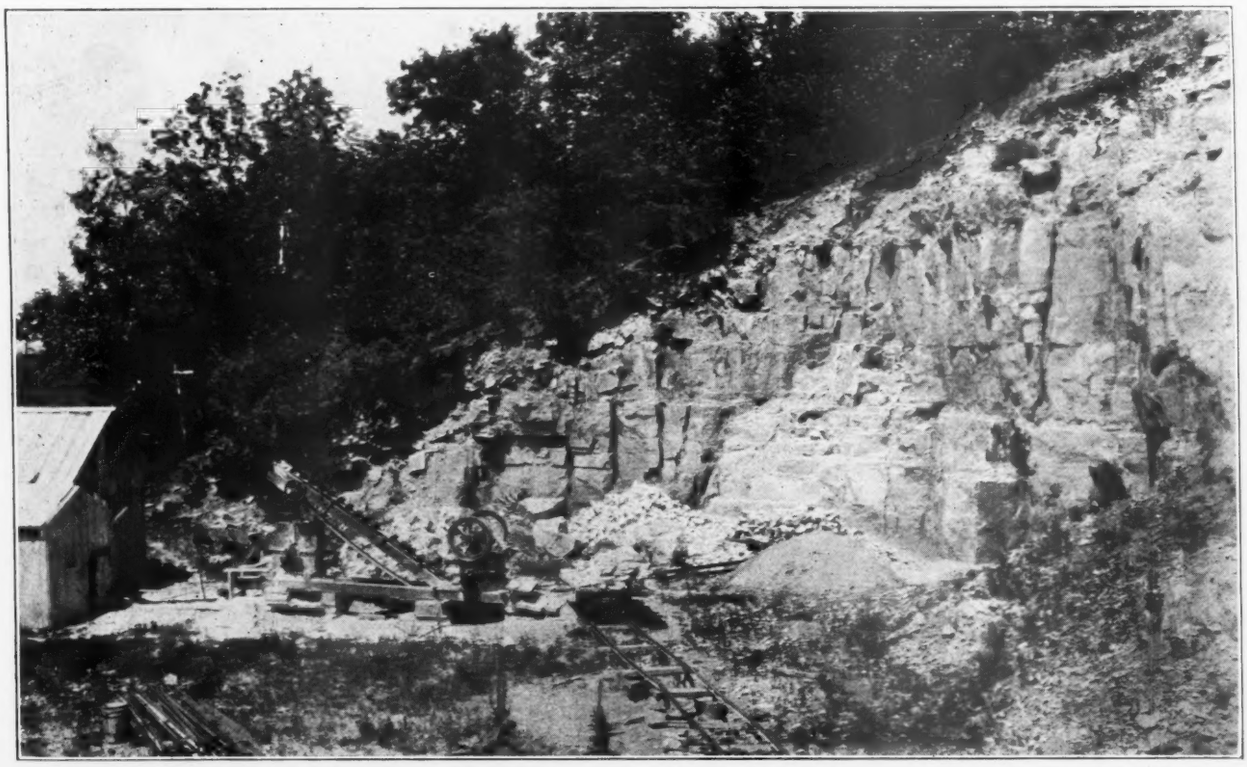
PRODUCES AGSTONE WITHIN STATE PARK

By A. C. Edwards

HISTORICAL facts concerning the early days of Trempealeau, Wisconsin, have recently been recalled with the death this spring of Mr. Arthur Gibbs, president of the Trempealeau Lime Products Company. This company is producing agstone from a state reserve or park at Trempealeau, Wisconsin. The town of Trempealeau had its beginning in 1685, when the French Commander, Perrot, established a trading post there and made it his winter headquarters. His domain stretched from the Great Lakes and the Mississippi to the then little known Pacific Ocean. It was not long before Trempealeau Bay became a trading center for the various tribes of Indians. The town was named after a mountain which rises for three miles out of the Mississippi which was called "La montague qui trempe a' l'eau." This is the second highest point on the Mississippi and being an island, it soon became a landmark known to all the traders, explorers, and voyagers of that early day.

Trempealeau became a town in 1856 and grew very rapidly due to the river traffic and the fact that it was a gateway to the whole northern Wisconsin country. Its population reached two thousand but has dwindled to the present 600 people due to the coming of railroads which have changed means of communication and points from which goods are distributed. Just below Trempealeau Mountain and extending into the town is another high mountain having very steep slopes and many cliffs with exposed ledges of rock. The southern end of this mountain has a large bare rock at its summit which was called Liberty Peak and was used as a signalling point in the early days. A little to the north of this rock is Eagle Cliff, which is shown in one of the illustrations. From this Cliff rock was secured in the early days to burn into lump lime. This was done in the old type pot kilns and then shipped by river boats to the various towns within reach. However, with the coming of railroads to this district, the burning of lime was discontinued at the Cliff due to the more favorable location of other lime producing areas being utilized.

Extending east, north and southeast of Trempealeau is a vast farming plain which, up to a few years ago, produced abundant crops. When the continued falling off in crop production was noted, the Extension department of the University of Wisconsin was called upon to aid farmers if possible. Samples of the soil were tested, and it was found that the soil needed lime. This had been removed by the plants bearing continued crops. Eagle Cliff was known to be of limestone formation, and samples of the rock from this ledge were tested, with the result that this rock was recommended as the proper material to build up or sweeten the soil. In fact it was found to have such excellent qualities as a soil builder, that the farmers



The Trempealeau Quarry

Character of Surrounding Country

were urged to produce it on a commercial basis. The application of this rock to the soil produced remarkable results. This was brought out very strikingly by noting the condition of two fields of the same crop planted under the same conditions side by side, except for the application of the lime rock to one section and no lime to the other portion.

However, in order that the best results be obtained from limestone when applied to soil as a fertilizer, experiments have shown that it must be finely ground and free from moisture. To satisfy the first requirement, pulverizing machinery had to be obtained. The chemical analyses made from the rock samples showed that no drying would be required as it contained but seven tenths of 1 per cent of moisture or less than the dried product being put on the market by some producers of agstone, the commercial name by which finely ground limestone suitable for soil sweetening or fertilizing is known.

Some of the farmers living around Trempealeau then organized the Trempealeau Lime Products Company in 1914 and purchased and installed machinery for the production of agstone. A 99-year lease on an 80-acre tract was secured which included Eagle Cliff and the exposed limestone on the top of the mountain to the south of the Cliff. A little later, a Mr. John A. Latsch of Winona, Minnesota, whose father was an early pioneer of Trempealeau, purchased 1,000 acres of land which included the tract leased by the Lime Company. In 1918 Mr. Latsch turned this property over to the State of Wisconsin to be used as a State Park and called it Perrot Park in memory of the early establishment of Perrot's headquarters. This historical account will explain the reason why this Lime Products Company is producing commercial agstone from within a State Park.

Showing the Character of the Deposits

The ledge of rock has been opened up 700 feet above the Chicago, Burlington and Quincy tracks, and due to the steepness of the slope an aerial tramway was provided to transport the rock from the quarry floor, which is 1,500 feet distant, to the loading bins which are located alongside of the railroad tracks 700 feet below. The rock is dolomite, and its bedding planes are nearly horizontal. Due to its structure it is easily quarried. The chemical analyses of the two representative samples given here show its similarity to the limestone quarried in the eastern part of Wisconsin which has found great favor as a building lime. Its lack of moisture should make it a very attractive proposition for the production of lump and hydrated lime as well as for agstone.

	Sample No. 1	Sample No. 2
Calcium carbonate	44.62	48.76
Magnesium carbonate	44.67	41.41
Sulphuric Anhydride	.12	.10
Sulphur	.05	.05
Iron and Alumina	8.40	8.02
Insoluble	.08	.12
Moisture	.70	.70

The present operations of the Trempealeau Lime Products Company are confined to the agstone season which extends from August to March. They have installed a number 3 Universal crusher for the initial grinding, which discharges the crushed rock onto an inclined belt conveyor fitted with cup cleats. These elevate the crushed rock and discharge it into a Universal pulverizer for the final grinding. This pulverizer drops the powdered rock onto a belt conveyor which carries the agstone and discharges it into the upper terminal loading bin. The crusher, pulverizer and two belt conveyors are all operated by a 25 h.p. Wagner motor through belt drives.

The upper tram loading bin consists of a wooden bin with hoppered sides leading to two gates, one opening to the right and the other to the left. The

(*Continued on page 82*)

BUILDS NEW MODERN CRUSHED STONE PLANT BECAUSE OF CITY EXPANSION

By E. D. Roberts

SELDOM does a crushed stone operator build an entirely new crushing plant at a new location when his old plant is still producing satisfactorily and the quarry is in the best possible condition. The Duluth Crushed Stone Company, however, has done this, abandoning a well developed quarry producing the best quality of rock for concrete aggregates and constructing a new and thoroughly up-to-date crushing plant. At the same time they have opened up a new quarry in the same quality of rock. The Duluth Crushed Stone Company was organized in 1903 to produce crushed rock from a quarry at a station on the Duluth, Mesaba and Northern Railway called 57th Avenue, Duluth. This is located in what is known as West Duluth and at that time was very sparsely settled. A modern crushed stone plant was operated using Bucyrus steam shovels for excavating the rock and American 36-inch gauge steam locomotives to haul the rock to the Allis-Chalmers crushers for reduction to the proper marketable sizes. A distributing yard was maintained in the heart of Duluth to dispose of the bulk of their output. Considerable rock was got out for riprap purposes and loaded onto cars by an American Hoist and Derrick locomotive crane or a similar crane made by the Ohio Locomotive Crane Company. Gabro or "Bastard Granite," rock of igneous formation, sometimes called trap rock, was the product of this quarry. This was developed to the point where today they have a face 110 feet high extending 900 feet in length without overburden.

Duluth is a rapidly growing city, and what was wilderness 23 years ago is now a city. Duluth can expand in only two directions, east and west, due to the bay on one side and the high hills on the other. With the approach of dwellings to the

A Portion of the Quarry

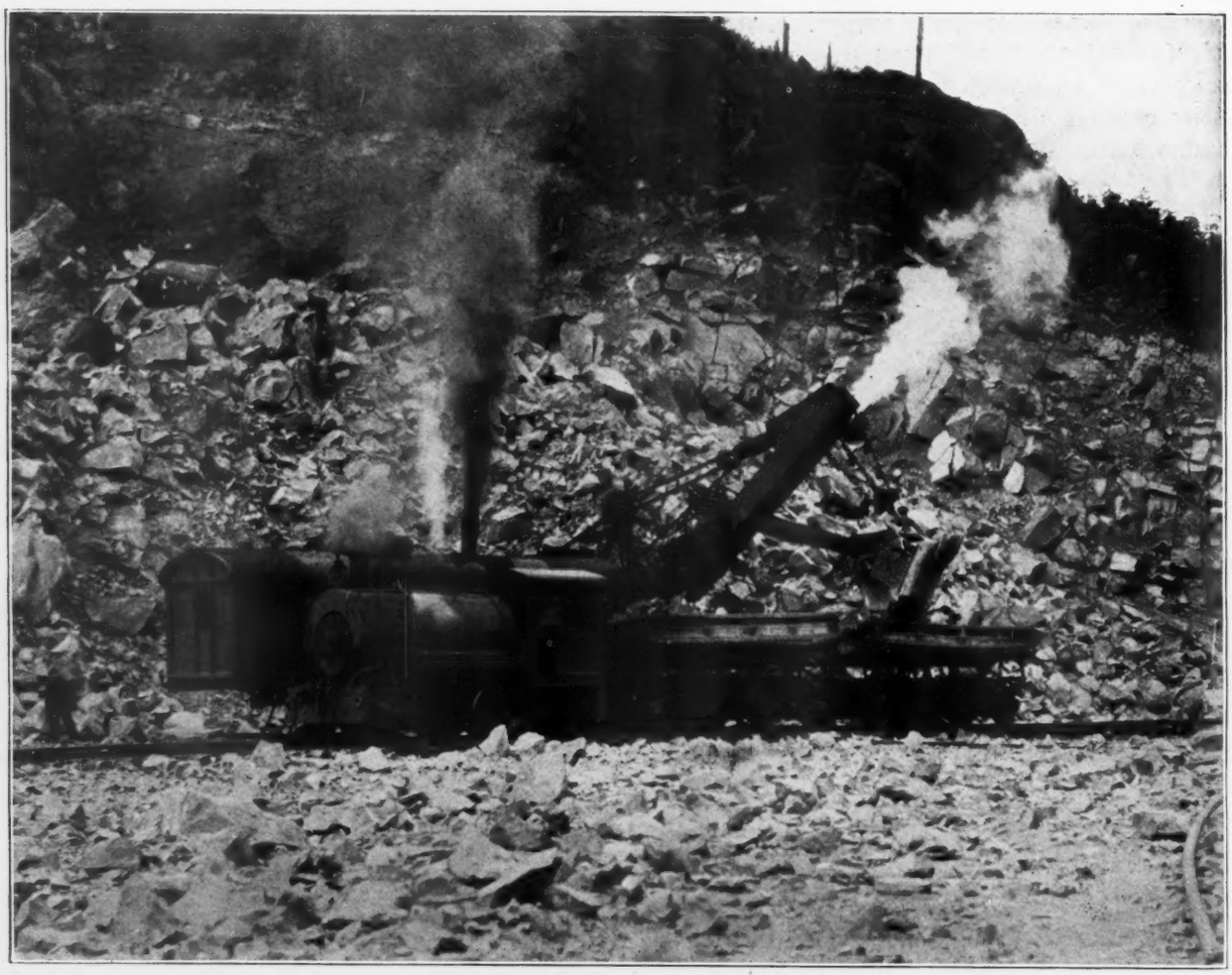
A Close-up in the Quarry

quarry, claims began coming in for alleged damages from the dust produced in crushing the rock. These claims became so numerous and onerous that it was decided to abandon the quarry and move far enough to be away from any future trouble. As the old quarry was now in the city, it was fitted up as a distributing yard for the product of the new quarry. A description of this yard will be given later in this article.

In selecting the new quarry site, three main requisites were kept in mind: the quality of rock should be the best obtainable; there should be no danger of future encroachment of the city; and the quarry should be accessible to a railroad. These three conditions have been met, as the rock from the new quarry is of the same excellent quality as that produced by the old quarry. Future encroachment by cities is not probable, as it is 14 miles from the center of Duluth and 2½ miles from Gary, an industrial suburb of Duluth. As there is a large plain fanning out to the south and west from Gary, there is little likelihood of any trouble from dust damage. The shipping question was solved by the selection of a site adjacent to four railroads and directly on the tracks of two, the Northern Pacific and Chicago, Milwaukee and St. Paul railroads, which serve the company through their Short Line Park Station, located at the quarry, and through short connections over the above railroads to Brewer on the Duluth, Mesaba and Northern Railway and Brewers on the Duluth, Winnepeg and Pacific Railroad.

The 57th Street Plant

In designing the new plant, consideration was given to the joint experience of Mr. C. D. Brewer, secretary and treasurer, who is in active charge of the company, and the plant superintendent, Mr. Chris Hosted. The requirements for the plant were turned over to the engineers of the Allis-Chalmers Company, Milwaukee, Wis., who detailed the plant. Construction of the new plant was started in 1922, but after its construction the old



Another Quarry View Showing the Character of Stone

plant was partially operated while the new plant was being broken in and a suitable quarry face developed. It was not until last year that the old quarry was finally abandoned as a rock quarry and the machinery dismantled. The machinery was sold for use elsewhere.

The New Quarry Plant

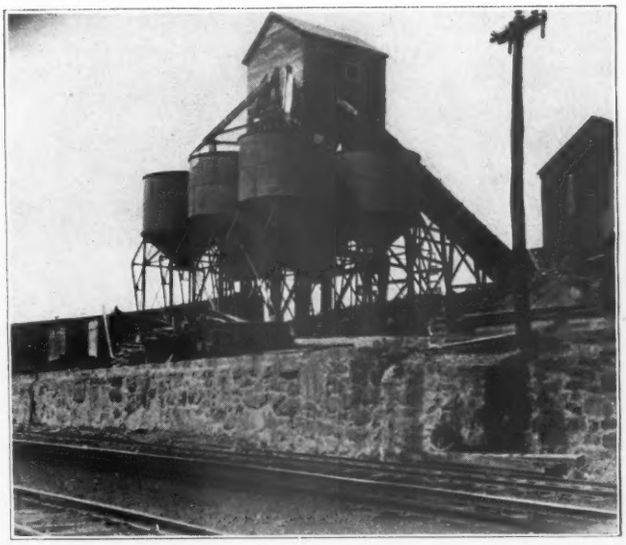
In the new quarry two Sanderson Cyclone drills are used to place well holes for breaking out the rock. These holes, seven and three-quarters inches in diameter at the top, are put down on 25 to 30 foot centers, loaded with 40 to 80 per cent Du Pont quarry gelatin, and fired with Bickford fuse. As there are no bedding planes in the rock, it breaks in all shapes, requiring considerable blockholing. These holes are drilled with ten Ingersoll-Rand Jackhammer drills and the boulders then broken. Some mudcapping is done when convenient.

Two Bucyrus steam shovels, a No. 70-C and a No. 80-C, are used to load the rock into 12 yard Western side dump cars, while a No. 50 Marion steam shovel is held in reserve. A 26½ ton Porter steam locomotive handles the loaded cars to the initial crusher, where their contents are dumped directly into two No. 12 type N Allis-Chalmers gyratory crushers. These are set side by side so that the material can be discharged onto a common belt.

A home-made air hoist is provided at the initial crushers to lift out boulders too large for the crusher opening. These rocks are then drilled with an Ingersoll-Rand Jackhammer drill and broken by means of wedges, no shooting being done at this point. Each of the large initial gyratory crushers is driven by a 150 h.p. Allis-Chalmers motor through a 22 inch belt. Both of these crushers discharge the crushed rock onto a common belt 42 inches wide, which operates on Caldwell-Link-Belt rollers. The belt travels up an incline to the battery of scalping screens in the crusher building.

The discharge from the 42 inch belt to the scalping screens is made through a stone box. This divides the flow so that equal amounts of rock go to the 60 inch by 16 foot Allis-Chalmers revolving screens, which are equipped with sand jackets for half their length. The screens produce three grades of material: dust to ½ inch, which includes all earthy material that might be in the rock, ½ inch to 2½ inches, and oversize. The first two sizes fall into hoppered stone boxes below the screens, while the rejects fall into another stone box leading to a battery of reduction crushers.

The smaller size, which includes the dust, is fed from the stone box onto a 24 inch belt conveyor which carries and discharges it into a bin at the end of the row of storage bins. By using this procedure the dirt does not get into the other sizes of rock produced. The ½ inch to 2½ inch rock falls from the stone box onto a 36 inch belt conveyor and is carried to the sorting screens. Here



Circular Storage Tanks for Loading Trucks

provision has been made to bypass the rock, if desired, directly to a bin for this material. This is done by means of a tripper installed on the belt line, so that the rock may be loaded directly from the belt into a car spotted on a track which runs between the crusher house and the bin house.

The rejects from the scalping screens feed through a stone box to a battery of three No. 7½ type N Allis-Chalmers gyratory crushers and discharge onto a 36 inch belt conveyor. This carries the product, together with the rock from a secondary set of crushers to the stone box feeding a battery of two sizing screens.

Two 60 inch by 24 foot Allis-Chalmers revolving screens are provided with 8 foot dust jackets for this final sizing. At present this company is fitted with screens giving the following sizes: Dust to ½ inch, ½ inch to 1 inch, 1 inch to 1½ inches, 1½ inches to 2½ inches, and the rejects. The rejects are carried back on a 24 inch belt conveyor and discharged into a stone box feeding to a battery of crushers, two No. 5s and three No. 4s, all Allis-

The Secondary Crushing, Screening and Storage Units

Unloading a Car of Stone to Crusher

Chalmers reduction crushers. This battery of crushers is so placed that each crusher discharges onto the same 36 inch belt conveyor that takes the discharge from the battery of three No. 7s. All the other grades of rock produced by the sizing screens, with the exception of the dust to ½ inch, fall into stone boxes with outlets arranged so that the rock can be led to any bin below. This provides flexible storage conditions and at the same time allows for mixing the different sizes of rock as may be desired by the customer. The dust to ½ inch rock falls onto a Universal vibrating screen which takes the chips ranging from ¼ inch to ½ inch out of the dust, discharging each size into the proper bin below.

A Porter 36½ ton steam locomotive spots the railroad cars for loading the rock either for shipment or for outside ground storage. Two tracks are provided under the bins for this gravity loading. If for shipment, the loaded cars are set on the outgoing track; if for outside storage they are hauled to the storage yard by the Porter locomotive, where they are turned over to one of the locomotive cranes for unloading. These two locomotive cranes, an American Hoist and Derrick and an Ohio, unload the rock to the storage pile and reload it for shipment when required.

The Twin Crushers

There is a difference of 84 feet between the quarry floor and the loading track under the bins. In order to move the cars this distance, a switchback, one of the legs of which passes under the gallery leading from the crusher house to the bin house, is provided so that the cars can be loaded directly from the belt by the tripper, thus maintaining intercommunication between the quarry and the outgoing railroad lines. This allows the loading of riprap rock directly into railroad cars in the quarry by the locomotive cranes. It also aids in getting supplies such as coal and heavy machinery from the railroad to the quarry or machine shop, which is located at one end of the quarry floor.

One of the noticeable things about the plant is the attention that has been given to detail. Every possibility seems to have been provided for. Oil for lubricating the two primary crushers and eight secondary crushers is pumped through under pressure and returns by gravity through a Bowser filter press to a large storage tank. The oil is cooled by means of coils passing through the tanks in summer so that it will not get too thin, and the quantity of oil in the large tank keeps it from excessive cooling and getting too heavy in winter.

Machine Shop Equipment

Few machine shops operated in connection with stone quarries are more complete than the one in service at this plant. Trackage is provided so that a steam shovel may be run inside the 60x80 foot machine shop. A large radial crane assists in handling any heavy pieces of machinery. A complete Sullivan drill sharpening outfit, consisting of a class A drill sharpener with furnace and magnetic indicator, together with an Ingersoll-Rand drill sharpener and an open hearth furnace, are provided for sharpening the small drill bits. A Sullivan bit sharpener for well drill bits grinds them after they have been heated in a home-made oil furnace.

The Sullivan magnetic indicator, previously mentioned, indicates when the steel has reached the proper temperature for quenching. It takes advantage of the fact that steel loses its magnetism when it has reached a certain temperature coinciding very closely with the temperature found to be the best for quenching drill steel. Therefore, by placing the bit on the indicator, it is known whether the temperature is high enough for quenching. If the steel has lost its magnetism, there will be no effect on the magnet in the indicator as it closes a circuit and therefore lights a lamp. If the lamp lights, the steel is heated further and again tested until the lamp fails to light, showing the steel has lost its magnetism. Advantage of this principle was used by the operators to make an indicator for determining the proper quenching

point for large well drill bits. A large horseshoe magnet is suspended near the bit and if the magnet draws over toward the bit, more heating is required; if not, the drill is quenched at once.

Provision for working the well drill tools has been taken care of by the installation of a 24 inch by 20 foot American lathe, a 24 inch by 20 foot Niles planer, a Barnes drill press, a small planer and a lathe. A large steam hammer now operating under air pressure has also been installed for any work requiring Smith shop practice. An Ingersoll-Rand 1,000 foot air compressor driven by a 350 h.p. motor is also located in the machine shop. A 100 foot Sullivan compressor is provided to furnish compressed air when the quarry is not operating. The 350 h.p. motor was manufactured by the Electric Machinery Company while the 75 h.p. motor operating the Sullivan compressor is a General Electric. Other installations have been made to provide for contingencies and for the comfort of the men, such as storerooms for the spare parts, overhauling the machinery at regular intervals and heating the machine shop by steam in winter for the men's comfort.

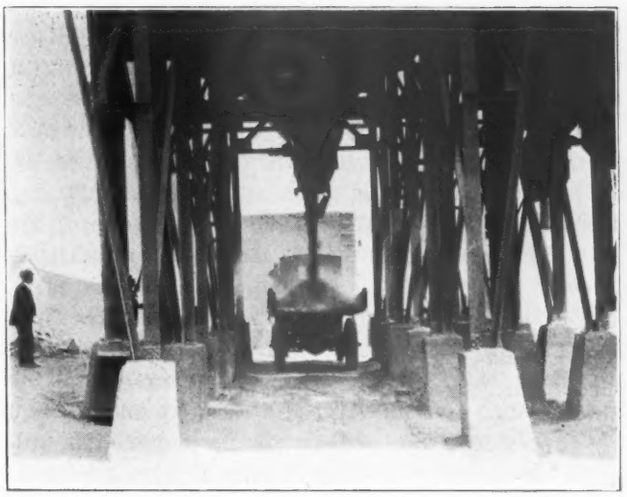
Distribution of Product

The portion of the plant's output which is not sold direct to the consumer in car lots is distributed from the two distribution yards maintained by the company in Duluth,—one at the old quarry site at 57th Street on the tracks of the Duluth, Mesaba and Northern Railway, and the other in the center of Duluth at Fourth Avenue East and Michigan Street, or one block from the New Duluth Hotel. The last named distributing yard is located on the tracks of the Northern Pacific Railway.

The company does not maintain a fleet of trucks for delivery of the crushed stone, most of the rock being taken by the contractors in their own trucks. Connections have been made, however, with trucking firms for deliveries when the purchaser so desires. As most of the material is used for concrete aggregates, it is necessary to stock a suitable sand. This is purchased from a sand and gravel firm at Carlton, Minn., which produces washed sand that will pass the State requirements.

There is a large demand for graded stone, such as the ½ inch to 2½ inch material produced by the scalping screens, for use in constructing driveways. This material is spread and tamped or rolled, after which a topping of the dust to ½ inch material is applied and the dust is settled into the voids of the base by sprinkling. Once the voids are filled, a very fine roadway is provided, and if more dust is put on when voids appear the roadway will be very durable under light traffic.

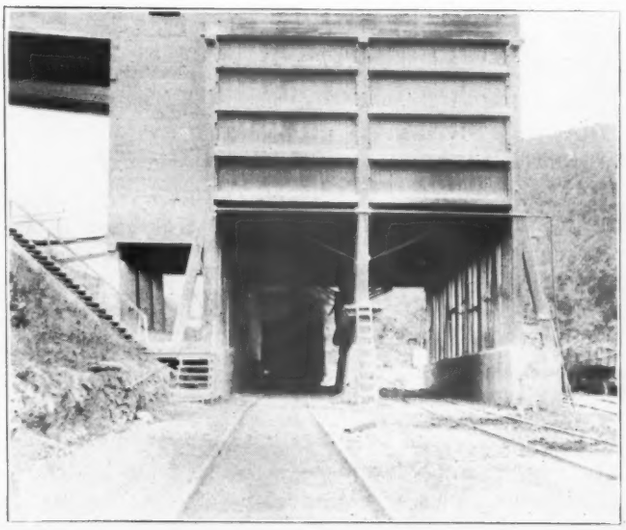
The Fourth Avenue East and Michigan Street yard, strictly speaking, is not a yard, as there is no storage, only bins being provided to carry the product. The sand or crushed stone is spotted over a track hopper constructed under the side track of



Loading a Truck

the Northern Pacific Railway. This hopper is a reinforced concrete opening under the railway track which supports a steel hoppered bin into which the car is dumped by opening the hoppered gates in the car. A Stephens-Adamson apron feeder draws off the material from the hoppered bin and discharges it onto an inclined belt conveyor which carries it up above ground, where it is discharged into a continuous inclined bucket elevator. This elevator carries the material about 100 feet to the top of the bin house, where it is discharged into a stone box. This feeds the material to a Stephens-Adamson reversible shuttle conveyor which distributes it to the proper bins. The material is drawn from the bins into trucks spotted alongside the track. A movable batcher has been provided in case a customer requires batched aggregates. After loading, the truck is run over a Fairbanks-Morse platform scale for weighing.

The Fifty-seventh Avenue yard, West Duluth, does not maintain any ground storage for material. Here, however, a four car track is provided for the storage of cement so that a contractor may secure materials in batched lots and mix the cement with



Loading Railroad Cars

the rock in the yard instead of where he is doing the job. The incoming cars of rock or sand are spotted on the track leading over the track hopper, which is similar to the one described. The material is drawn directly from the steel hopper onto an inclined belt conveyor that carries it to the top of the bins, where it is discharged into a stone box with six outlets. Each outlet leads to one of six Blaw Knox steel bins below, each holding 125 tons of rock.

Four of the bins are provided with batchers so that two different proportions of batching may be run at the same time. The usual procedure is for the truck to spot under the stone bin and receive the supply of stone, pull on to the cement car and spread the proper amount of cement over the rock, pull back under the sand bins and place the sand on top of the cement. This avoids the cement being blown away in transit to the job. Batched materials are not weighed, but unbatched materials are weighed on a Fairbanks-Morse platform scale conveniently located to the outgoing driveway.

The Duluth Crushed Stone Company has been able to maintain a position as the only crushed stone producer in this locality, serving Duluth, a city of over 100,000, and the surrounding country with first-class concrete aggregates. They have been able to keep this high record by producing the best material and at all times giving adequate service. Close attention to details, a well constructed plant, proper maintenance of machinery, and a fair price can be enumerated when reviewing what constitutes adequate service with this company. F. A. Brewer is president, and C. D. Brewer is secretary and treasurer. Their offices are at 1506 Allworth Building, Duluth, Minnesota.

(*Continued from page 76*)

American Steel and Wire Company tramway, which transports the agstone from the quarry to the loading bins is very simple in its operation and construction. There is one load-cable passing on each side of the bin on which the buckets travel. These are suspended from the cable by a wheeled carriage. There are two buckets, one on each load cable and both fastened to a common haulage cable. This passes over guide pulleys and around a large wheel placed just above the loading gates, and a brake applied to this wheel controls the speed of the buckets which have an excess weight of 1,200 pounds of agstone on the loaded side. Each bucket travels up and down on the same cable; they do not go around the wheel at the top and are not disconnected from the haulage cable at any time. When the loaded bucket arrives at the lower terminal, it is discharged by throwing over a lug which allows the bucket to turn over and discharge its contents into a large bin. From here the agstone is drawn off either into cars spotted alongside the tracks or into trucks or wagons, if for local use.

Since the death of the President, Mr. Arthur Gibbs, the stockholders of the company are undecided what to do with the business. It would seem that this would be an ideal proposition for a year 'round plant, producing lime and hydrate with agstone as a by-product. With the excellence of the deposit and ready market for the product, some arrangement should be made to carry on the business and develop it on a larger and more economical scale. The remaining officers of the company are John Lehman, vice-president; William Nichols, secretary and treasurer, although George G. Gibbs is temporarily looking after the business of the company.

Heat and Pressure Tests Applied Jointly

A method has been devised which makes it possible to determine resistance to heat of steel and tile building materials while under the pressure to which they would ordinarily be subjected in a structure. The Underwriters Laboratories are now making combined heat and pressure tests. For these tests a big steel frame has been built and is supported by girders with the sill resting on hydraulic jacks. A wall of the material to be experimented which is within the steel frame. This wall, when in place, is subjected to a furnace heat while pressure is applied by the jack at the same time. This test will help in determining whether a wall of a certain building material of construction will hold or give way when exposed simultaneously to heat and pressure.

Corporations Coming Bigger

New incorporations during 1926, to date, have been larger in number, and larger in capital than in recent years. The capitalization of new business ventures during 1926 has averaged $1,269,000,000 each month. The average for the semi-period during 1925 was $704,000,000, while it was $679,000,000 in 1924 and $787,000,000 in 1923 for the same period.

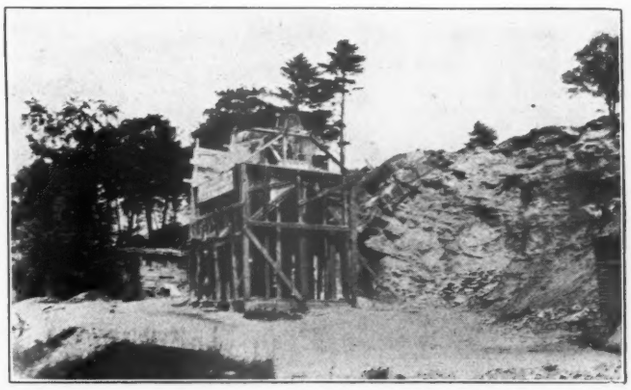
New business ventures and expansion of existing business are undertaken more readily in prosperous times than in dull times. In 1923 the capital average was high. In 1924 when the business pace receded somewhat, the average quickly showed a decline. It rose again in 1925 and shows a very large increase for 1926. In 1913 the monthly average capitalization of new incorporations was about $175,000,000 each month. The difference between 1926 and 1913 is an indication of the extent by which business expansion has widened since prewar times. In 1919 and 1920, new incorporations were in very heavy volume, averaging more than $1,000,000,000 monthly in 1919 and about $1,250,000,000.

NORTHERN NEW ENGLAND AGGREGATE PLANTS INCREASING PRODUCTION

By F. A. Westbrook

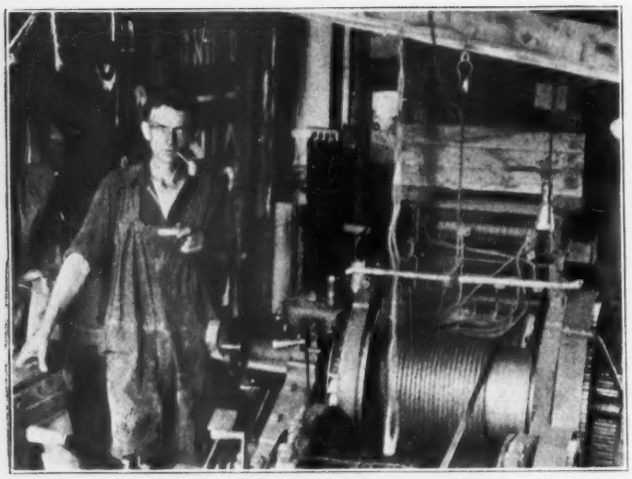
THERE seems to be an impression that the crushed stone and sand and gravel business is not very active in northern New England. While this may have been justified in the past, conditions are very rapidly changing. In fact, they have changed to a very marked degree already. It is perfectly logical that this should be the case, because of the long established summer holiday business of this section of the country, which brings thousands of tourists every year and automobiles from every state in the union. Good roads are therefore a vital need, and they are being rapidly increased in mileage. Extension of good roads for trucking and motor buses and increases in the use of concrete construction are also being influenced by rapid developments in the industrial situation in a way which will undoubtedly gain great impetus in the immediate future, and which is probably as yet realized by only a very few people. This is due to a variety of causes which are of unusual interest because they are indicative of the changes which the extensive inter-connection of electrical power systems is bringing about. It is a change referred to by such men of national prominence as Gen. Guy E. Tripp, head of the Westinghouse Electric & Manufacturing Company, and Glenn Frank, president of the University of Wisconsin, as the "New Industrial Revolution."

A brief explanation will show how this is coming to pass. In motoring through the states of Vermont, New Hampshire and Maine, the traveler cannot help being impressed with the frequency with which he passes through small towns having a developed or partially developed water power site and a mill or two, sometimes of fair size. They may be seen in even apparently really remote regions. These are frequently woolen or textile mills, wood working enterprises of some kind from wooden heels for ladies' shoes to excelsior, paper mills and others. They have used the water power when they had it and wasted the surplus during much of the year. On the whole, they have been



Face of the Quarry Before Setting Off the Blast at Lewiston

Track for Dump Car from Hopper to Crusher at Cloutier and Company



Electric Hoist and Engineer at Cloutier and Company

on the downward path until quite recently.

But now, with the idea of super-power and the spread of the inter-connection of electrical generating stations, a change is taking place. The formation of the New England Council with its various committees, and especially its power committee, is coordinating the efforts to rejuvenate these widely scattered industries. The power companies are buying the surplus from the developed water sites, encouraging the manufacturers to burn their waste wood and sell them the surplus power which may result, and in turn the central stations are selling power to these industries at times of low water. The result of all this is that even the most remote parts of New England are becoming more prosperous industrially and that the crushed stone and gravel business is increasing. For instance, in the city of Lewiston, Maine, there are three crushed stone or gravel plants within a mile of each other along the shore of the Androscoggin River which have appeared only very recently; another is about to be started in the town of West Paris; there are several operations in the vicinity of Portland, Maine, not to mention others in various sections of Northern New England.

View of Gravel Bank Showing Drag Line Scraper Digging Out a Path at Cloutier and Company

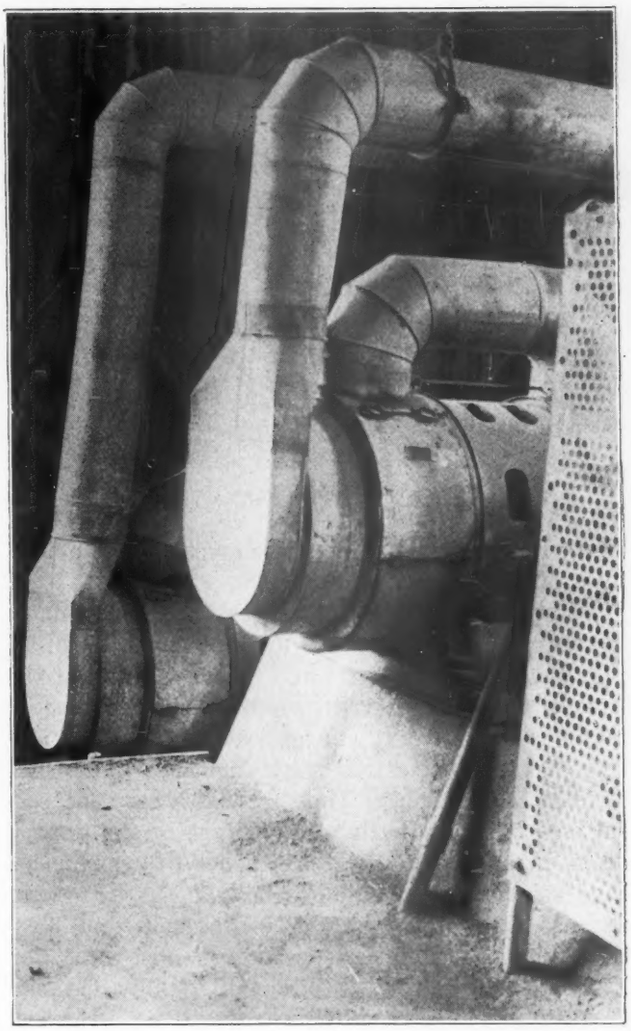
Among these is W. E. Cloutier & Company of Lewiston, Maine, where sand and gravel are produced. The deposit is located in a large pocket of rock, as shown in one of the illustrations, and is excavated by means of a Sauerman LeClair power scraper. A Maine Electric Company electrical hoist driven by a 50 h.p. induction motor is used to operate the scraper. Roebling wire rope is also used. The scraper brings the material down into a hopper from which it descends by gravity into an Easton automatic side dump car, which is hauled by a hoist from the same house as the scraper. The contents of the dump car are dumped into a number 2 New England Road Machinery jaw crusher and afterwards elevated by a Good Roads Machinery Company elevator to the sizing screen made by the same company. Crusher, elevator and screen are driven by a 50 h.p. General Electric Company screen with at least one Blue Streak belt. Talcott belt fasteners are used.

The plant is operated by three men. The foreman runs the drag line and dump car; there is one man constantly at the feed to the crusher; and the third man is a teamster for moving surplus sand from the bins to the storage piles. Shipments are made by team and motor trucks. W. E. Cloutier and Company is a local dealer in coal and building supplies, and the gravel plant is run in conjunction with that business. Consequently, practically all of the output is consumed locally. It consists of fine sand, coarse sand, roofing gravel, pea stone and two larger sizes of gravel.

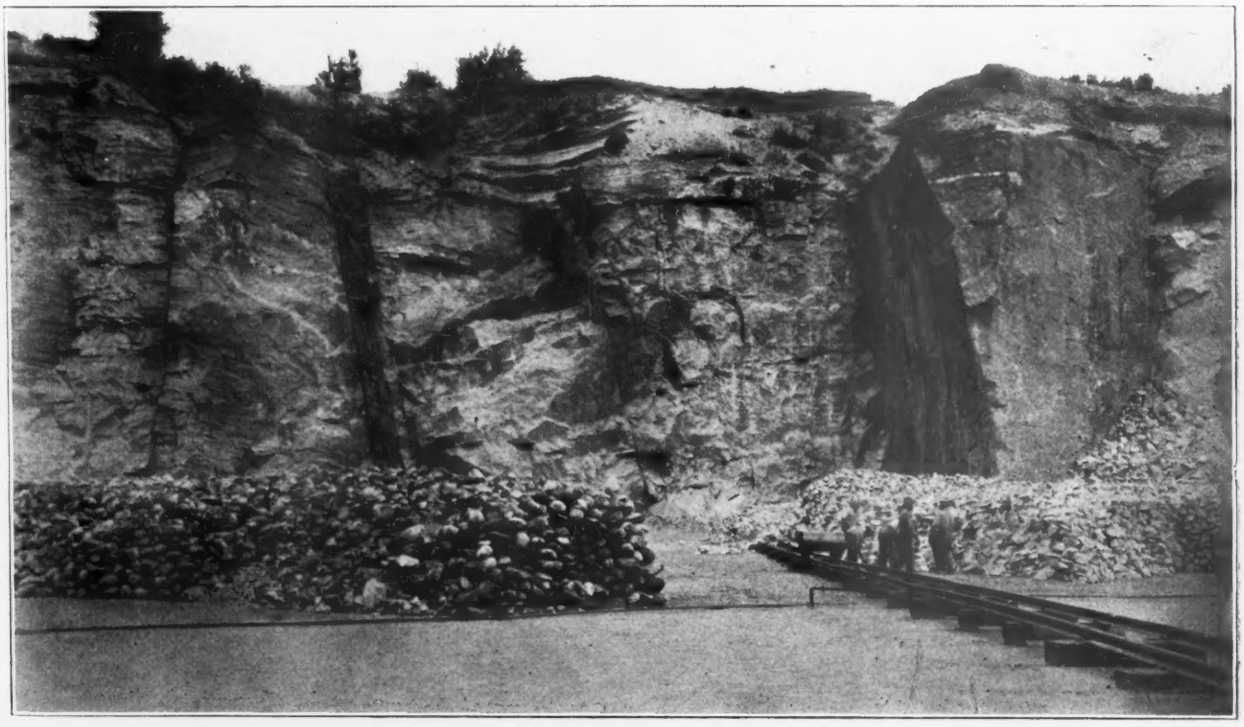
There are two 4-yard and two 3-yard Mack trucks equipped with Heil hoists for making delivery to the more distant points and six 1-yard dump wagons for nearby deliveries. A Link Belt wagon loader is provided for loading from surplus storage piles. The plant has been in operation for about five years and is older than any of the others in the neighborhood.

The Lewiston (Maine) Crushed Stone Company claims to have the best stone for road work in Maine. However that may be, it is a fact that practically the entire output of 150 yards of crushed stone is used for road construction in the vicinity of Lewiston, and plans are under way for opening up an adjacent deposit of gravel. The company has been in existence for less than four years, and its success is entirely due to the extensive highway improvements, which, in fact, are being made everywhere in northern New England. The rock which is being quarried is Muscovite gneiss and is situated along the shore of the Androscoggin River. At some points there are deposits of gravel located in pockets of the rock, and it is this kind of deposit which the company expects to develop during the present season.

Mr. Martin, the head of the company, has a very good plan for using his machinery to the fullest advantage for the production of crushed stone and gravel. The gravel pit is located directly adjacent to the stone quarry, and Mr. Martin's plan is to work the former at night with a power scraper and the latter in the day time, as at present, but to use the same machinery for both. It will be possible to produce 125 yards of gravel a night with two men; one on the scraper, and one tending the crusher and screens. Of course, it will then be necessary to provide separate storage space for the two kinds of material. The demand for gravel is good, and the business, laid out in this economical way, should be profitable. The present plant produces 150 yards of crushed stone per day. There is a number 4 Champion jaw crusher and a Good Roads elevator and screen with bins as shown



Dust Protection Covers for Motors at Lewiston



Face of Quarry Showing Tracks and Symmetrical Piles in Foreground at Lewiston

Drill Sharpener and Forge at Lewiston

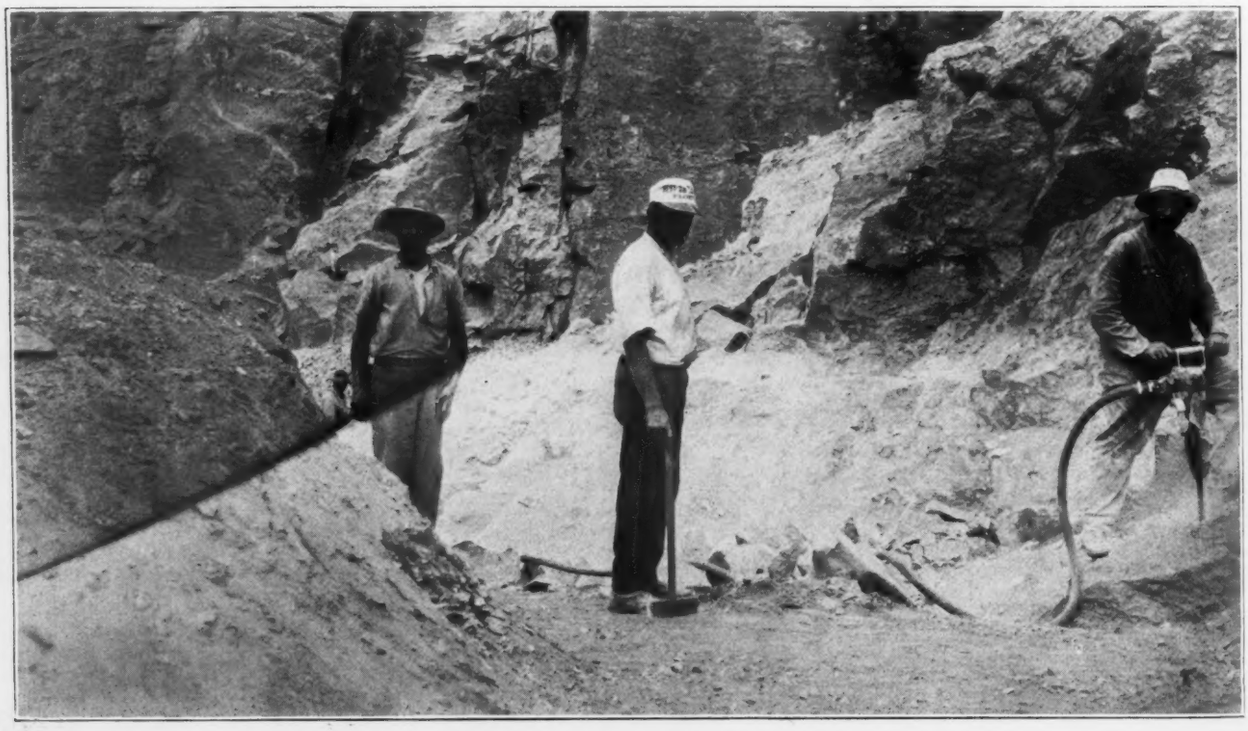
Tamping Charge of Dynamite in the Drill Holes at Lewiston. Mr. Martin, head of the Company in the Straw Hat

in the illustrations. The entire machinery is driven by a 50 h.p. Westinghouse motor.

Blasting is done by 60 per cent Hercules gelatin dynamite. The holes are made 15 feet deep, 20 feet back from the front and 6 feet apart. At the time of the writer's visit, preparations were being made to fire a heavy charge later in the day, and two of the illustrations show the men in the act of tamping the holes. The shot was a very successful one, blowing the top of the face of the quarry down to the floor. Drilling is done by means of Ingersoll Rand D C R 430 drills and jack hammers, and air is supplied by a 10x10 Ingersoll-Rand electrically driven compressor. There is also a Leyner X50 sharpener as shown in one of the illustrations. This equipment is located on the hill near the top of the quarry. Knox Bros .air hose couplings were in use.

The overburden is stripped by means of a New England Road Machinery scraper and a remade Lidgerwood hoist. The material thus obtained is sold for filling-in purposes in Lewiston. Stone is taken the very short distance from the working face of the quarry to the crusher in one horse dump carts. In view of the small area covered by the quarry and the present comparatively small production, this method is satisfactory. The crusher is located under a platform so that the carts may be dumped directly into it. The crushed stone is then raised by the elevator to the screen. A small forge shop is located near the crushing machinery for repair work and is equipped with a blower made by the Champion Blower & Forge Company.

At the present time all shipments are made by motor trucks. Although the operation is located

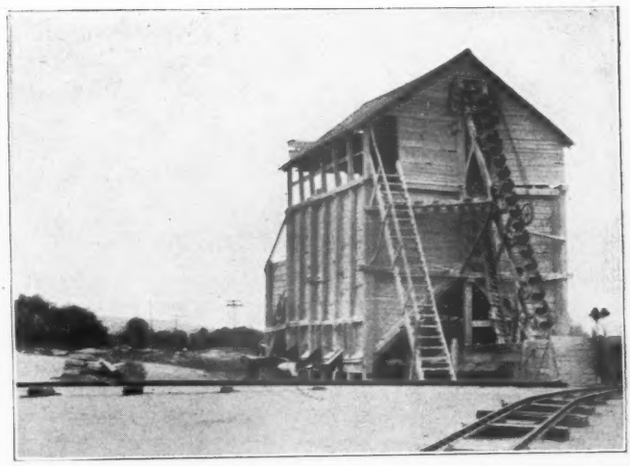


Breaking Up Large Pieces of Rock With Jack Hammer at Lewiston

on the line of the Maine Central railroad, there is no siding. There is not yet much occasion for direct railroad connection as the stone is being used for road work and some building construction in the immediate vicinity. Mr. Martin made a point of showing some of the places where his output was being used, and these are shown among the illustrations. Probably the most interesting thing about this plant is its newness and the fact that apparently it is indicative of a growth in the crushed stone and gravel business in this region which may be expected to increase at a healthy rate over a wide area.

The city of Lewiston, Maine, has its own quarry and crushing plant for road work. The quarry is located in the Androscoggin Valley and the thing which first impresses the visitor is its extreme neatness. Indeed, the floor of the quarry looks as though it were gone over with a vacuum cleaner and as shown in one of the halftones, the stone after a blast, is assembled in symmetrical piles. It is an inspiration to a person who likes orderliness and while it may be carried to an extreme in this case, it is also a shining example to many operators who do not pay sufficient attention to this important and sometimes neglected detail of good management.

The blasting, of course, is only done periodically and as soon as a blast has been set off the stone is gathered up into piles, the larger pieces first being broken up with an Ingersoll-Rand jack hammer. The stone is brought in to the Climax crusher in small cars running on tracks and pushed by hand. As shown in the illustration, the crusher is placed below the unloading platform so that the cars may be dumped into it. From the crusher the stone is elevated by a New England Road Machinery elevator to rotating screen, made by the same company, which separates the sizes and drops them into storage bins.

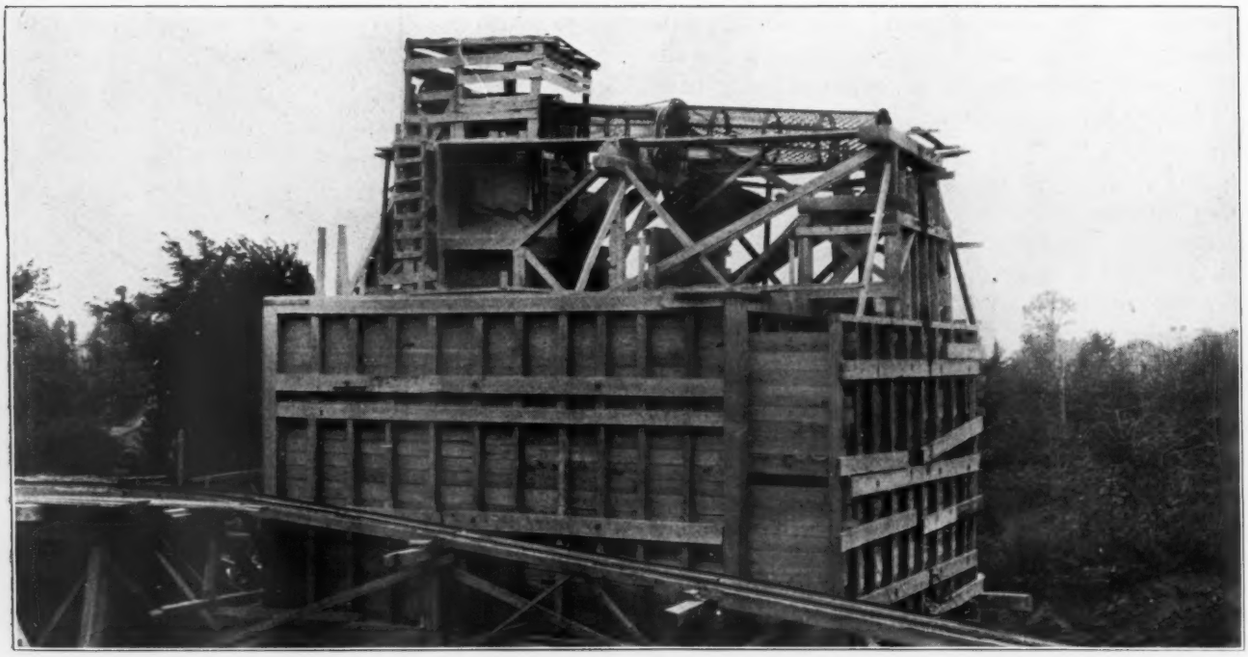


View of Crushing Plant Showing Tracks and Elevator from Crusher to Screen at Lewiston

Among the most interesting details of this plant, which seem to be often overlooked, are the protective casings provided for the motors. These are shown in one of the illustrations. The superintendent states that trouble with the motors was very frequent and disconcerting before these casings were installed. In order to provide ventilation

Setting Off the Blast at Lewiston

View of Quarry and Dump Car at Forgione and Romano



Rotary Screen, Bins and Incline from Quarry to Dumping Platform Above Crusher at Forgione and Romano

for the motors, a fan is provided which draws air from outside, through a filter if necessary and blows it into the motor room. The equipment was supplied by the Motor Protection Company, and has been installed on the motor which drives the Ingersoll-Rand compressor as well as the crushing plant motor.

Motor protection, if not too expensive to buy, should pay for itself in a short time by a lessening of maintenance and saving of losses due to shut-downs. Judging from the condition of motors commonly seen in stone crushing plants there must be a considerable annual operating cost chargeable to dust. This not only gets into the bearings and causes extra wear but also clogs up air spaces of the field so as to interfere with proper ventilation. This results in excessive heating and consequently excessive power consumption and shorter life—not to mention the serious losses which occur from shut-downs. In fact, it might, upon careful consideration, appear that even a very considerable expense for adequate motor protection would be a

Chute Down Which Quarry Stone is Dumped at Forgione and Romano

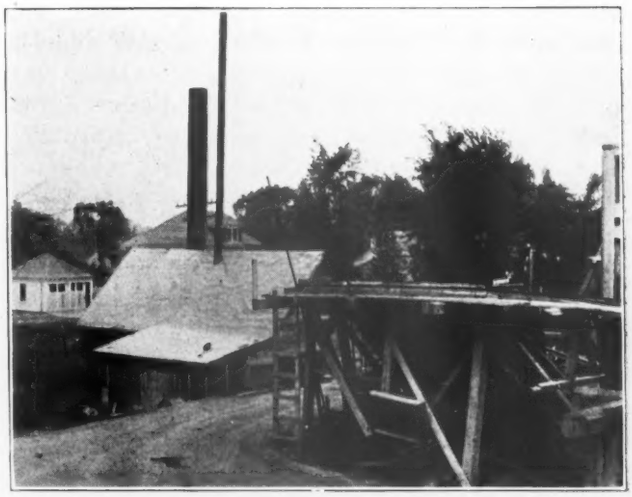
well paying expenditure to make.

It seems strange that this rather small municipal plant in northern New England should be the only one observed among something like fifty plants visited during the last year where such careful, and doubtless well justified means have been employed to keep out dust from the motors. It is a part of the general scheme of neatness and orderliness which makes this plant so conspicuous.

In some parts of the country, contractors erect their own crushing plants because the large stone companies are so rushed with orders that there is frequently difficulty in obtaining prompt deliveries; in other parts of the country, the contractors have operations of their own because there are few, if any, large companies from whom they can obtain material. The latter condition is the case in the neighborhood of Portland, Maine, and as a result, Forgione & Romano, general contractors, operate a small size quarry and crushing plant.

This plant is located within the city limits of Portland, Maine, and the land comprises some very valuable building lots, which are being materially improved by the removal of a ledge of rocks which covers the land. In fact, where the operations are being performed there is to be a future street, now in process of being cut through. Under these circumstances, the quarry is not being carried down below the level of the existing street onto which the new street will be joined. As the ledge of rock is not very high above this level, the quarrying operations will undoubtedly spread to a wide area.

The plant has a capacity for 300 tons per day. Steam is supplied from a Godfrey-Kesler boiler to a Stanwood & Company reciprocating engine to operate the machinery of the crushing plant. The plant uses a Universal Road Machinery Company



Dumping Platform Above Crusher and Engine House in Background at Forgione and Romano

jaw crusher, an elevator and rotary screen also made by the same company. There is a rather unique arrangement at this plant which seems to work very satisfactorily. This consists of a pipe about 12-in diameter which carries the tailings from the screen back to the crusher. The tailings drop from the screen into a chute or hopper which feeds them into this pipe. This is placed at a sharp angle and passes back under the screen and through the bins to the crusher. The discharge end of the pipe is shown in one of the illustrations and the upper end near the screen is illustrated in another half tone.

A track with branches is provided from the working face of the quarry to the crusher and the material is conveyed by Koppel side dump cars. The cars are hauled between the quarry face and crusher by an engine and hoist made by the Dabe Engine Company. The rock is gone over by hand before loading into the cars and pieces which are

View of Incline to Crusher and Dump Car at Forgione and Romano.

too large for the crusher are broken up either with sledges or by drilling. Loading is also done by hand. Surplus stone which cannot be taken care of in the bins is stored in piles. A loader, driven by a Fuller & Johnson gasoline engine, is provided to load trucks from these piles.

Part of the drilling operation is being done under contract and has been found to be advantageous. The drilling work is done by an Ingersoll-Rand portable gasoline engine driven compressor purchased through the Waldo and Brothers Bond Company of Boston, Massachusetts. The company has done some of its own drilling, and continues to do so, by means of steam operated drills, but drilling with the help of the portable compressor is so much simpler that most of the work is now being done that way. There is a forge shop, adjacent to the engine house where drills may be attended to and ordinary repairs made.

For blasting, Hercules 75 per cent gelatin dynamite is necessary on account of the hardness of the rock. At the present time, the company has a large sewer job and the contract for several buildings, including a good sized garage. The stone for these is delivered directly from the plant to the job by means of five Clydesdale 3-yard trucks, equipped with Wood hydraulic hoists. Of course a plant of this kind is in this work only temporarily and consequently the layout lacks the finish and completeness of more permanent installations. In fact, some of the machinery has been moved from another somewhat similar operation. Nevertheless, this form of stone crushing enterprise has a sound economic basis, because it not only provides the necessary material for its own general contracting business but is also improving real estate at the same time.

Employment Steady

Since the beginning of 1926, employment has been reasonably steady for workers throughout the United States. The U. S. Department of Labor has received favorable reports from industrial plants in practically every section of the country. The Department of Labor compiles each month an index of employment which is based on payroll data from thousands of mills and factories, covering practically every important line of manufacturing.

The latest index reveals that the number of jobs available has been steadily increasing for many months, even though not as many persons are employed as in previous years. There are 113 persons now at work for each 100 who had regular employment in 1921. The industrial depression of 1921 caused a wide spread unemployment. Fewer jobs were available in 1925 than at the present time. In 1925, 111 persons were employed for each 100 that were employed in 1921.

National Highway Construction

The federal and state governments now have completed slightly more than one-half of the road improvements planed in a union wide highway project which has been under way for several years. The project calls for the improvement of approximately 270,654 miles of highway, the cost of which is being made jointly by national and state appropriations. About 145,508 miles of roads have been surfaced and are in use this year, linking the states together, according to the public announcement made by the Bureau of Highways. Close to 20,000 miles of additional road will be surfaced during 1926. There were completed during 1925, 17,836 miles of highway. New York with 9,626 miles of improved roads now leads all other states in highway development. Ohio ranks second with 9,502 miles and Wisconsin, third, with 7,978. Pennsylvania and Texas each have more than 7,000 miles

of highway classed as improved. Delaware is the only state reported has having completed the improvement of all roads in its section of the national system. Delaware has 506 miles of improved roads. Rhode Island has 406 miles of improved road which is less than any other state in the union, although its full program only calls for 768 miles. The term "improvement" is elastic as used here. In one state it may mean a concrete surface, in another gravel, and in a third something else.

Industrial Strikes Decreasing

Industrial disputes during the last eight years have decreased more than 50 per cent, according to the U. S. Department of Labor. In 1918 there were 3,353 disputes and the number increased again in 1919 until in 1920 there were 3,411 disputes. Industrial disputes fell off in the years 1921 and 1922 when business was poor on account of dull times. In 1923, 1924 and 1925 which were prosperous years, the number of industrial disputes dropped. There were 1,553 disputes in 1923, 1,249 in 1924, 1,301 in 1925. This reduction in the number of industrial disputes represents a saving to the public, employees and employers.

GEORGE H. NOONE OPERATES ECONOMICAL PLANT PRODUCING SAND AND GRAVEL

By George Ransom

CHARACTERISTIC of the sand and gravel deposits in the valley of the Charles River is the operation of George H. Noone. Small hills and ridges are composed of this material, and it usually extends 75 feet or more below the mean water level of the river. Excavating, of course, is an easy matter, as it may be done with a large bucket and hoist and conveyed to the machinery on belts. As there are few large stones, the matter of handling is still further simplified. In fact, a few pieces of railroad rails placed 6 inches apart over the loading hopper will remove the few large stones which are occasionally found, and even among the material which passes through these 6 inch spaces there is not enough of large size to require very great power to drive the conveyors or call for great strength or width of conveying machinery.

At the George H. Noone sand and gravel plant, West Roxbury, Massachusetts, where conditions similar to those described are found, there is a 2 yard Haywood bucket operated by a 32 h.p. Mundy steam hoist. The sand and gravel mixture is dropped from the bucket into a hopper, as shown in one of the halftones. From the hopper it is fed to a 24 inch Link Belt belt conveyor, 325 feet long, by a Link Belt feeder. This conveyor feeds into another placed at right angles to it which reaches the machinery of the plant. The reason for this right angled arrangement is the spreading out of operations as the deposit above water line has been removed. It furnishes an interesting example of the flexibility with which conveyors can be arranged so as to be extended, section by section, to

Conveyor at Right Comes from Pit, Center Conveyor to Scalping Screen Conveyor in background to Sizing Screens

View of Gravel Pits showing Large Quantity of Sand and Absence of Large Stones

Structure for Supporting Scalping Screens With Crusher Below

Conveyors to Scalping Screens and from There to Sizing Screens

View of Conveyor Passing Under the Road to the Hopper in the Background

one point of excavation after another. Formerly a derrick supplied sand and gravel to the conveyor extending straight out from the plant. However, when the water level was reached, rather than start in with hydraulicking operations at once, it was thought preferable to take out a large bank across the road. This was easy to do by installing the 325 foot conveyor at right angles to the existing conveyor and building a bridge over it where the conveyor crosses the road.

All the sand and gravel is first passed through a Huntington-Robinson rotating scalping screen which removes all sizes over 1½ inches. These are dropped into a 6 inch McCully gyratory crusher. The crushed stone is discharged into a short 15 inch Link Belt return conveyor and again deposited on the main conveyor to the scalping screen. From the scalping screen there is a 24 inch Link Belt conveyor, 146 feet between centers, which goes to the sizing screens. There are two sets of screens, one stationary and the other revolving. The stationary screen, made by the Wickwire-Spencer Company, is placed at an angle of about 30 degrees and removes the sand which is used mostly for brick. This screen is made in four sections and covers an area of 60 feet by 100 feet. The remaining material then goes to the revolving screen, which separates it into ¼, ½, 1 and 1½ inch sizes and deposits them in bins. There is a chute for making a surplus storage pile of sand.

There is no direct railroad connection at this plant, and all shipments are made by truck. The company owns four 6 yard Mack trucks equipped with Heil hoists and hires six or more other trucks

Sizing Screens with Storage Bins Below

View of Bucket and Gravel Pit

when the business is in the active stages. The office building, with the Fairbanks scales, is shown in one of the illustrations. All of the machinery, except the derrick, is electrically driven.

Several additions are under consideration. In the first place, it will sooner or later be necessary to start taking out material from under water either with a drag line or dredge, and there is still some more material above water level which can be secured in the old workings. In either case, a hopper will be required at the junction of the right angle where the old conveyor joins the new. The mast of the old derrick in this section is still in place, although now dismantled, and this will probably be re-equipped with a hoisting engine and bucket before long. In addition to this, a water system is to be installed for washing out the sand so that the operations of the plant will not be dependent on the weather. In fact, Mr. Regan, the superintendent, with the co-operation of the owner, is planning to develop this operation to the fullest extent practicable.

Manufacture of Concrete Units Described by Government

While concrete units have long been used in building construction it is only within the past few years that the manufacture of concrete brick, block, and tile has attained a rapid growth. This growth has been brought about largely by the heavy demand for building materials and the efforts of interested associations in bringing to the attention of the public the desirable features of concrete units.

Numerous inquiries are received at the Bureau of Standards, of the Commerce Department from people who are interested in learning more of the properties of concrete units and the details of the manufacturing methods. In order to answer these questions in a reasonably complete manner, a circular has been prepared covering the essential features of concrete brick, block, and building tile, and giving some general information about their manufacture.

The more important properties of concrete units are discussed and some of the advantages of their use in masonry building construction are set forth. Concrete block, tile, and brick have been defined and the recommendations for the standardization of sizes of the several types of units to avoid waste are given. The recommended standard sizes adopted are given as well as the large number of sizes in present use. This comparison shows that by maintaining definite standards of size for the units a large saving will result in an outlay for machinery, molds, and pallets, as well as the stock to be carried in yards.

Various materials widely used in the manufacture of concrete products are described in detail. The questions of proper size and quality of both coarse and fine aggregates are discussed and the use of admixtures, facing materials, and coloring processes are outlined. The need of careful proportioning, the proper time of mixing, the methods of molding, and the several means of curing are discussed at some length. The requirements for concrete units are dealt with from the structural, architectural, and fire resistant viewpoints. The methods for conducting tests of concrete products and the proper interpretation of data from test reports are outlined.

Factors affecting the financing of a concrete products plant are considered from an economic standpoint and suggestions are made to prospective investors to investigate fully all local conditions which may affect the life and successful operation of a plant.

The circular proper is followed by a bibliography of books, technical papers, and periodicals dealing with various phases of the manufacture of these units which will be of particular interest to those contemplating entering this line of work. Several specifications are also given from the standards of the American Society for Testing Materials governing the quality of aggregates and the method of testing, together with the American Concrete Institute specifications for concrete block, tile and brick.

Locomotive Industry Active

The locomotive industry of the United States produced a total of 896 steam and electric locomotives during the first six months of 1926, according to data collected from principal manufacturing plants by the U. S. Commerce Department. The data includes all locomotives except those completed in shops owned by railroads. For the industry, 1926 is shown to be the best year since 1923 by the Commerce Department's data. In the first six months of 1925 a total of 619 locomotives were completed and in 1924 the output was 711 locomotives. Production in both of these years was below 1926.

Production in the first half of 1923 was 1405 locomotives. This unusual activity followed a year in which output of all commodities was in a decided slump, it will be recalled. During the first half of 1922, production totaled only 362 locomotives. The increase in output in the last three years is due to increased domestic demand since foreign buying of locomotives has been falling off. The locomotive industry is one of the principal manufacturing lines of the United States. It employs thousands of workers and is distributed quite generally through the eastern states.

SOMETHING DIFFERENT IN A GRANITE QUARRY

ONE of the largest groups of granite quarries in the world is located in Mountain Park, Oklahoma, and is owned by the Svoboda Granite Corporation, Omaha, Nebraska. These quarries differ from almost all other quarry deposits. Instead of being several hundred feet under ground, the rock protrudes from the surface, in some cases 700 feet. Nature in some by-gone age caused a mighty upheaval of the earth and forced the rock through to this great height. The only obstruction left by nature was a mass of boulders which had to be removed before the granite could be reached.

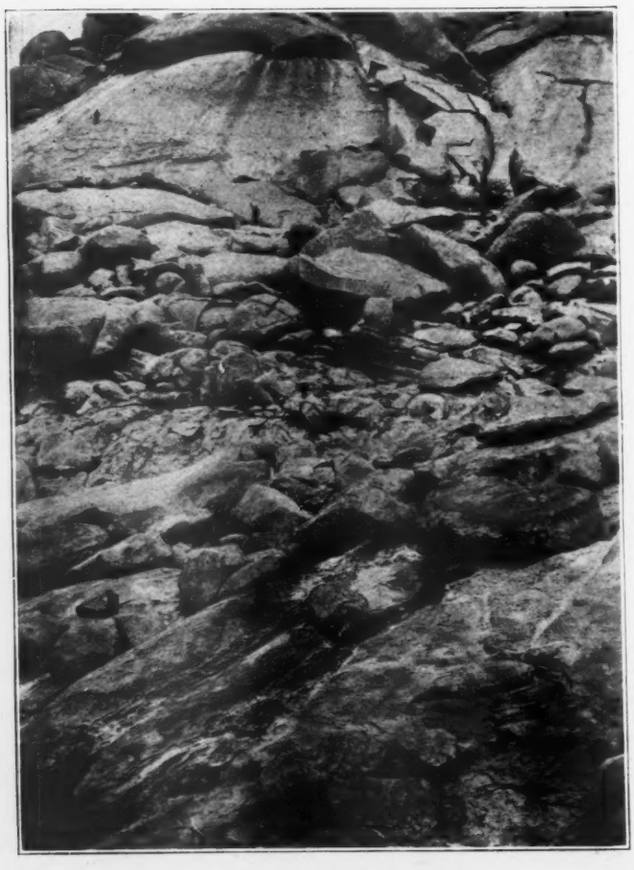
These quarries have been under development for the past ten years. However, progress has been somewhat slow owing to the presence of the boulders. Many of these have been removed, and ten quarries are now in operation. At these quarries six colors of granite are obtained; black, pink, red, Egyptian red, gray and pink statutary. The pink granite is in great demand because of its delicate color. The granite is of very fine composition and takes a mirror-like polish.

In most granite quarries the stone must be brought to the surface from the bottom of the quarry which in some cases is as deep as 400 feet, and before the quarries can be worked at all the gravel and rock above must be removed. Further, during the quarrying of the stone, pumps are continually at work to keep the water from flooding the quarry. As the deposits here are above ground there is no need of pumps to remove water and after the boulders have been removed the quarry-

F. Svoboda at the Right Appears to Have other Interests Beside Granite

A View in the Granite Quary Showing Part of the Crew

Getting Ready to Lift a Slab



Part of the Mountain of Granite

ing can be started at once. The last quarry opened at this plant was 200 feet above the ground level, and cables have been installed to convey the granite to the mill, where the stones are dressed to the desired designs.

The mill is one of the most modern in the country as regards machinery and conveyors. The heavy machinery employed for preparing the granite used in constructing the State Capitol building at Oklahoma City is now part of the equipment at this mill, having been transferred from Troy, Oklahoma. Other machinery in the mill consists of compressors, derricks and drilling machines of enormous size and modern design. The travelling cranes used in the mill are 38 feet in width. The construction of the building is along the lines followed at the Presbey-Leland Company's granite mill, Brattleboro, Vermont, which was described in the May 15th, 1925 number of Pit and Quarry.

Plans have been made for the employment of 500 granite cutters, and land for the erection of houses for the workmen has been purchased. This company is very considerate of the workmen. Bath houses with showers have been built on the shore of the lake which is near the quarries; also boats are provided for those who enjoy fishing.

The president of the corporation is Frank Svoboda, who learned the stone-cutting trade when a boy. He is a graduate of one of the European universities. He has also made a study of quarries and the operation of them, visiting many of the largest and most important quarries both in this country and Europe to investigate their methods and equipment used. Mr. Svoboda is also interested in the retail monument business in Omaha, Nebraska, where he has been in business for the past 19 years, and he is thoroughly acquainted with the various granites used for monumental and building purposes.

Fire Brick From Cyanite

The properties of a fire brick made of cyanite are being investigated by the U. S. Bureau of Standards. The cyanite came from a recently discovered deposit in India and considerable of it contains more than 95 per cent pure cyanite. The investigation to date has shown that cyanite, either raw or calcined, pure or bonded with clay, will produce a refractory brick capable of withstanding the standard or modified laboratory tests for high grade refractory bricks.

The bricks not only showed excellent resistance to spalling and to deformation under load at high temperature but also have shown a uniformly low thermal expansion and a high melting point. Petrographic analyses revealed complete conversion of cyanite to mullite in the test specimens. Results of the laboratory tests to date show that cyanite makes a fire brick equal in quality to many other bricks known as super refractories.

PIT AND QUARRY FOREIGN DIGEST

Swiss Hydraulic Cement Standards in Force from January 1, 1926

Portland cement is required to give the following strength values (converted to our units):

	Tension	Compression
7 days	280 lbs/in²	3220 lbs/in²
28 days	392 lbs/in²	4550 lbs/in²

High strength portland cement is of the same composition as standard portland cement but is prepared by special processes. It must show the following strength values:

	Tension	Compression
3 days	392 lbs/in²	4550 lbs/in²
7 days	490 lbs/in²	7000 lbs/in²
28 days	560 lbs/in²	9100 lbs/in²

Aluminate cement has been put into commercial use too recently to warrant fixing standards.

(Bull. tech. de la Swisse Romande.)

Production of Magnesia from Dolomite

Deals with processes based on the Hamblock Galleri, German patent 280,738. A cooperative semi-large plant was built in which the burnt dolomite is treated with soda ash and CO_2 (from dolomite burners) to form soluble $MgNaH(CO_3)_2$; the latter on heating gives $MgCO_3$ and Na_2CO_3. $CaH_2(CO_3)_2$ is but slightly dissolved in the solutions. A raw material was used with the following compositions:

CaO	31-32 per cent.
MgO	20-21 per cent.
Al_2O_3, Fe_2O_3, SiO_2	1-3 per cent.
Loss on Ignition	45-47 per cent.

The products have the following composition:

	Magnesia Carbonata		Magnesia Usta		Lime Residue
SiO_2	0.24	....	0.44	0.61	0.57
Al_2O_3	0.08	....	0.02	0.17	0.57
Fe_2O_3	0.07	....	0.30	0.15	1.65
CaO	0.98	0.04	2.20	2.51	47.08
MgO	42.34	42.29	91.12	90.04	5.43
Loss on Ign.	56.31	58.16	5.88	5.95	49.09

The article is amply illustrated.

(Dr. Ludwig Kiepenheuer-Zement, 1926, 471-5)

Theory of the Shaft Furnace

A theoretical discussion of the distribution of heat and of temperatures in the charge leaving the furnace and in the exit gases, as well as the arrangement of temperature zones within the furnace. Such a theoretical discussion can serve as a basis for the practical study of the behavior of shaft furnaces.

(Henry Le Chatelier—C. R. Acad. des Sciences, March 15, 1926, and Le Ciment, July, 1926.)

Expansion of Industrial Glass

A considerable number of glasses were studied after complete chemical analysis and the temperature of the transition point determined as well as the coefficient of volume expansion at various temperatures. Winkelmann and Schott's additive law is proved incorrect, but no simple law can be deduced from the data presented.

(M. Samsoen, C. R., Acad. des Sciences, June 7, 1926, and Le Ciment, July, 1926)

Highway Code

Temporary Code for the maintenance of automobile highways of concrete. Indications as to when repairs are required and how they should be made.

(Die Betonstrasse, July 8, 1926, 21)

New Measurements and Observations on the Automatic Shaft Furnace for Cement

A shaft furnace with 50 ton capacity was used for experimental purposes to determine temperature zones, gas composition, etc. The necessary sampling devices and recording instruments were constructed. Many data were collected and are represented in tables, graphs, etc. The thermal balance is established. Air pressures are studied, the possibilities of utilizing the waste gas, heat, etc. Much important information has been collected in this series of illustrated articles. 2 section drawings.

(H. Richarz—Zement, 1926, 492-496, 507-512, 531-534, 549-552, 562-565)

Influence on the Tensile Strength of Keeping Mortar and Concrete Moist in First Days

Standard tensile strength samples of 70 varieties were kept in a moist box in 2 series, the first for 1 day, and the second for three days. Then both were exposed to air for 12 years. The first series (1 day) was on the average 25 per cent weaker than the 3 day series.

(Dr. Haegermann—Zement, 1926, 515-516)

Evaluation of Hydraulic Properties of a Slag Sand

Rapid test is necessary to determine whether a given slag is suitable for use in manufacturing iron portland cement or blast furnace cement as the standard methods require four weeks. A color reaction (methylene blue after treatment of sand with caustic potash) has been found to give much more rapid results on microscopic examination. Excellent illustrations accompany the article. A

determination of the refractive index of the sand gives excellent information and the method of carrying it out is indicated together with tables of results.

(A. Guttmann and C. Weise—Zement, 1926, 527-531, 547-549)

Decorative Pressed Cement Blocks

Methods of production, means of obtaining desired effects, suitable materials, etc. With 8 figures. The indications for obtaining highly decorative blocks with imitation mosaic and other multi-color effects and the machinery needed are clearly shown.

(A. Bahls—Zement, 1926, 553-556)

Chemical Relationships of Lime and Magnesia to Iron Oxide

This is a study with the object of elucidating the interactions of lime (and to a lesser extent of magnesia) with iron oxide in portland cement and the nature of ferrites.

(Prof. R. Nacken and Dr. M. E. Grunewald—Zement, 1926, 561-562)

The German Marble Industry the Last Three Centuries

Historical article leading up to and including present practice in quarrying, dressing, etc. Illustrated with samples of use of German marble in public buildings.

(U.v. Oppen—Steinbruch and Sandgrube, 1926, 347-349, 369-371, 397-399)

Production and Utilization Sand for Sand Blasting

Gives comparisons of output on castings cleaned by hand and by sand blast. The specifications for such sands, their geological occurrences and origins, etc.

(W. Ropke—Steinbruch and Sandgrube, 1926, 415-416)

Preparation of Anhydrite Cement

Calcium sulfate, natural or artificial (gypsum) on dead burning gives anhydrite which by the use of certain accelerators can be made to take up water to form gypsum and exhibit strong cementing powers. The best accelerator (or catalyst) is sodium bisulfate; as anhydrite occurs naturally it need only be ground to be ready for use and thus offers attractive possibilities.

(Prof. P. P. Budnikoff—Tonindustrie-Zeitung, 1926, 1009-1011)

Refractory Materials for Iron and Steel Industry

A general review of the properties and specifications of the refractories used in the steel industry.

(E. H. Schulz—Z. Ver. deut. Ing. 1926, vol. 70, 408-10)

Determination of Soluble Silica in Cements, Mortars, Concretes

The cement (1 g.) or mortar (4 g.) is added, little by little, to 50-60 cc. of cold hydrochloric acid ($d^{15} = 1.12$). The reaction vessel should be cooled in a current of cold water. The solution is filtered and the silica in the filtrate rendered insoluble in the usual manner. If a small quantity of the soluble silica is precipitated the residue is treated with a warm 5-6 per cent sodium carbonate solution, this extract being added to the main filtrate.

(D. Florentin—Comp. rend., 1926, 183, 53-55)

Manufacture Light Forms of Concrete or Artificial Wood Composed of Fibrous Organic Materials and Cement

Organic material, e.g., sawdust, is heated gradually to 120-130° or treated with materials such as oils, resins, soaps, emulsions, etc., in order to render it water-repellent and less susceptible to change in volume with change of moisture content. It is then mineralized (cf. E.P. 244, 178; B., 1926, 130) to make it suitable for combining with cement, etc. Alternatively the material may be treated with a weak solution of an alkali or an acid, or with a solution which will dissolve resinous compounds, before mineralizing and mixing with cement.

(Broadway Trust Co., Ltd., C. D. Burney, and J. E. Temple, E.P., 253,007, 16.12.24)

Manufacture of Cement from Waste Lime

Waste lime from the Leblanc soda process is heated in a revolving furnace at a temperature up to 700°, according to the properties required in the finished product, and after grinding, mixed with small quantities of alum, potash, or borax (which may be added before the heating, if desired), or with ground glue. The product forms a hard cement or plaster on mixing with water.

(R. Illemann—E.P. 253,448, 31.12.25)

Floor Covering Tests Completed by Mellon Institute

The Mellon Institute of Industrial Research has recently completed exhaustive tests of varying types of flooring. These tests, which have overthrown some time honored conceptions, should be of interest to both industrial and domestic builders. One of the curious results was the disclosure that ordinary maple wood possesses much the same degree of resistance to abrasion as does marble. From the results of this test we also find cork tile nearly three times as wearing as portland cement, and rubber nearly five times as wearing as vitreous tile.

All Western Road Show Program

A tentative program for the second All Western Road Show, which will be held on the Marina at San Francisco from October 7th through the 15th, has been arranged. The tentative program which will prevail in the main at least is as follows:

Thursday, October 7—Opening day. Reception and registration of visitors.

Friday, October 8—Dealers' Day. Informal reception and meeting of construction equipment dealers. "Get acquainted" dinner dance in the evening.

Saturday, October 9—Educational Day. Entertainment of numerous delegations of students from universities and preparatory schools, interested in construction methods and practices.

Sunday,October 10—San Francisco Day. Show thrown open to general public of San Francisco. Special ceremonies participated in by city officials. Designed to interest the people in the cause of more and better highways. No registration.

Monday, October 11—State Officials' Day. Annual convention of Western Association of State Highway Officials.

Tuesday, October 12—County Officials' Day. Annual convention of Western County Officials' Association, including county supervisors, engineers and commissioners.

Wednesday, October 13—Contractors' and Engineers' Day. Road show banquet to be held in the evening.

Thursday, October 14—Rock Products Day. Meeting of quarry operators and sand and gravel producers from all sections of the West to discuss mutual problems.

Friday, October 15—Closing Day.

The list of exhibitors who have already made reservations for space include the following.

T. L. Smith Co., Carey Company, Koehring Co., Orton Crane & Shovel Co., Hercules Trailer Mfg. Co., G. H. Williams & Co., Le Roi Co., The Good Roads Machinery Co., J. D. Adams & Co., Caterpillar Tractor Co., Galion Iron Works, The Parsons Company, Leach Company, Blaw-Knox Co., Sterling Wheelbarrow Co., Madsen Iron Works, Full-Crawler Company, Insley Mfg. Co., Curtis Pneumatic Machinery Co., Construction Machinery Co., Jaeger Machinery Co., Crown Bitumens Co., Lufkin Rule Company, Universal Crane Co., Northwest Eng. Co., Waukesha Motor Co., Moore Speedcrane Co., Austin-Western, Continental Motor, Willamette Iron & Steel, Hughes-Keenan Mfg. Co., Snow Motor Co., Ersted Machinery Co., Schramm Co., Trailmobile Co., Marion Steam Shovel Co., Dowflake Company, C. H. & E. Co., Ransome Concrete Machinery Co., Gray Giant Co., Eismann Magneto Corp., Speeder Machinery Corp., Cresson-Morris Co., Portland Cement Association, Wehr Company, California Corrugated Culvert Co., Western Highways Builder, Domestic Engine & Pump, The Knickerbocker Co., Rawls Mach. & Mfg. Co., Link-Belt M. & G. Co., Climax Engineering Co., Cleveland Tractor Co., Davis Machine Works, The Buda Company, Killefer Mfg. Co., Bay City Dredge Works, Lakewood Eng. Co., Chausse Oil Burner Co., Harnischfeger Corp., Brown Hoisting Machine Co., Russell Grader, Universal Shovel Co., Dallman Mchy. & Mfg. Co., Miami Trailer Scraper Co., Whitehead & Kales Co., Brookville Truck & Tractor Co., Ruckstell Sales & Mfg. Co., Euclid Crane & Hoist Co., Ford Motor Co.

Power of Trade Commission in Balance

When the supreme court of the United States meets to begin the October term, less than four weeks hence, it will be confronted with questions of extreme importance with respect to the power of the federal trade commission and congress over corporations. It will have before it the problems as to government authority over corporations which have been raised by Professor William Z. Ripley in his demand for closer federal scrutiny into corporation affairs and will be expected to define the limits of federal power and of state authority.

The Claire Furnace Company case, which has been hanging fire in the court for three years, is one of the first matters calling for the consideration of the court.

This company with 21 other steel and coal companies, is resisting the right of the trade commission to examine its books, the commission acting under resolution of congress which had ordered an investigation to get data bearing on cost of production with a view to possible legislation. The companies obtained an injunction to prevent the investigation of their books and papers in the supreme court of the District of Columbia and this was upheld by the court of appeals of the district. The government then appealed to the supreme court of the United States. The corporations contend that part of their business is manufacturing and mining which is not interstate commerce, that this business is not segregated from interstate activities on their books, and that therefore they cannot be compelled to submit their books and papers to examination.

If the position of the corporations is sustained by the supreme court it is recognized that it will be a death blow at the power of the federal government over corporations except those engaged exclusively in interstate commerce or closely related business, such as the railroads.

The Easton Bodies

The Easton Car and Construction Company has recently issued bulletin 303, describing the bodies which they manufacture. The three types of bodies described in this bulletin are Rapidump, Rollover and Special Rollover.

These bodies are the product of years of concentrated effort in body building backed by twenty-five years experience in designing steel cars. The rapidump bodies are ruggedly built with annealed steel plates, steel under-frames and case hardened wearing parts. The frames are particularly low and eliminate any tendency of the loaded body to twist the chassis. The latch holding the body when loaded is positive, simple and foolproof. The method of operating the body is unique, the ease and speed with which it operates being due to rockers outside the body which permits a complete roll in dumping. Under steam shovel loading conditions the body can never be loaded so that it will not discharge as soon as the latch is tripped.

The body with its low lip and squat subframe has a loading height of only 50 inches in a normal position. This height can be reduced to 35 inches when necessary to load by hand. This is done by releasing the latch when the body is empty. The body will automatically come to rest in a semi-dumped position when it can be locked, and loaded to its full capacity, which will cause the body to automatically right and lock itself ready to haul the load away. To dump the load the driver need not leave his seat or stop the truck. He releases the latch and the body rolls over to an angle that permits positive discharge of all its load.

The rollover is somewhat similar to the rapidump in many respects, but is made with a high lip which does not permit hand loading as easily as the latter. The rollover is especially suitable for hauling dry aggregate, crushed stone, sand, gravel, quarry stripping and the like. This body has been standardized in two sizes for Fords, 1 and 1¼ yards. The body comes ready for mounting, which can be done very quickly. It is securely fastened to the truck frame with two U bolts and two standard bolts to the cross member of the frame.

The special rollover body is built for transporting concrete. It will haul wet concrete with a minimum splash and can best clear itself by dumping to an angle of 60 degrees or more. It is designed for a water level capacity of 1½ yards so as to permit the haulage of approximately one cubic yard of concrete without spillage.

Beckwith Resigns

H. C. Beckwith, for eleven years general manager of The Byers Machine Company, has resigned, and will relinquish his executive duties in December, to make his future home in California. Mr. Beckwith will retain an official connection with the company, as vice-president and will continue to serve in an advisory capacity.

The New Holland Line

The New Holland Machine Company has recently issued bulletins describing the machines and equipment which they manufacture, some of these being described here. Rock crushers are built in three types, swinging jaw for primary crushers, roll crushers for recrushing, and hammer crushers for clinkers, soft sand rock, or other material not easily handled by the jaw or roll type. These crushers are built in sizes to crush from 1 to 12 tons per hour, are stationary or portable, with or without elevators or revolving screens.

Portable stone bins are built in two sizes: 15 and 25 ton capacity. Either size can be used with any New Holland crusher or any other make crusher requiring a portable bin. The bins are built in sections bolted together and can be shipped, knocked down or erected. The partitions are movable, allowing each compartment to be made larger or smaller according to amount in each grade. The bottoms are lined with heavy sheet steel.

The 15 ton bin is fitted with three draw chutes on each side and a number 24, 9 foot three-section back geared revolving screen. This requires a 19 foot elevator from the crusher when the bin is raised the proper height to discharge into a truck. The 25 ton bin has four draw chutes on each side and a number 24, four section back geared revolving screen, requiring a 22 foot elevator from the crusher when the bin is raised the proper height to discharge into a truck.

Portable combined jaw and roll crushers are built in four sizes and are complete crushing plants on wheels, specially designed to make finer grades than can be produced with jaw crushers only. These machines are fitted with either smooth or ribbed rolls and will crush all kinds of rock for road making and concrete work and make sand for building purposes and the like.

The portable loading elevators made by this company are driven by a small electric motor with loading hopper and 4 foot chute screen. These elevators are built in all sizes from 6 to 60 feet with capacities up to 75 tons per hour and are suitable for all kinds of material from sand up to anything than can be carried in an 18 by 11½ by 8 inch bucket. Other equipment made by this company consists of: recrushers and rolls, belt conveyors, screens, conveyors of the belt, scraper and screw types.

New Mundy Hoist

The new Mundy 3 speed transmission hoist is described in a bulletin recently issued by the Mundy Sales Corporation. This hoist is built with a sliding gear transmission similar to that used in automobiles and motor trucks. With this arrangement the hoist will handle average loads at more economical speeds than a single speed hoist. With the single speed machine it is the usual practice to change the reaving in order to handle heavier loads. With this new hoist the operator has at his command three different line pulls and speed ratios. This speed and line pull change may be performed very quickly and eliminates handling all loads at the same speed.

This transmission is a great saving on derrick work in general; rather than change the reaving in the derrick, it is only necessary to move the gear shift lever to obtain the higher line pull to raise the load. This three speed hoist therefore gives a greater flexibility in hoisting. The lateral thrust of the transmission is taken care of through ball bearings on each side of the silent chain drive which runs in an oil-tight case. All the gear shifts and clutch levers are mounted on the hoist so that the operator does not have to move from the operating position to change speeds. The brakes on the hoist are fitted with asbestall frictions. These are not affected by oil or moisture and will outwear many sets of the wooden type. They are composed of a composition of asbestos fibre and fine brass wire and a binding compound, vulcanized and compressed under enormous pressure in moulds.

The hoists are made in two types, gasoline and electric. The gasoline hoist is built in standard sizes from 20 to 75 horsepower. They are equipped with Waukesha four cylinder power units, silent chain drive, and automatic safety brakes. The electric hoists are built complete with General Electric motors, controllers and resistors, and like the gasoline type have the automatic safety brake. These hoists are also built in standard sizes from 20 to 100 horsepower. Larger sizes of both the gasoline and electric three speed hoists are built special to meet the contractors requirements.

Talc Production in 1925 Better Than 1924

The total quantity of talc mined in the United States and sold in 1925 was 182,256 short tons, valued at $2,011,793, according to a statement prepared by the Bureau of Mines, Department of Commerce, which was compiled from individual reports of producers. The figures comprise 5,684 short tons of crude talc, valued at $24,533, 895 tons of sawed and manufactured talc, valued at $107,691, and 175,677 tons of ground talc, valued at $1,879,569. They represent an increase in quantity of 2 per cent, and a decrease in value of nearly 10 per cent, as compared with 1924. There were 23 producers of talc in 1925, the same as in 1924.

Of the total quantity New York sold 85,109 short tons, valued at $993,913, as compared with 78,340 tons, valued at $1,162,488 in 1924; Vermont sold 54,883 short tons, valued at $533,603, as compared with 61,653 tons, valued at $573,747, in 1924; and California sold 14,883 short tons, valued at $194,975, as compared with 16,335 tons, valued at $247,799, in 1924. The remainder of the output was produced by Virginia, Pennsylvania, New Jersey, North Carolina, Maryland and Georgia. Imports of talc for consumption in 1925 were 20,993 short tons, valued at $450,532. Corresponding figures for 1924 were 17,809 tons, valued at $342,355.

Why Air Cleaners Pay on Gasoline Engines

By G. S. Hamilton

If your industrial gasoline engine is operating under dusty conditions, some provision should be made for cleaning the air that enters the engine through the carburetor. Air cleaners will pay for themselves by reducing the up-keep cost of the engine. They will keep down repair bills, thus saving you real dollars and cents.

The carburetor mixes gasoline and air in correct proportions. This mixture is induced into the cylinder heads where it is exploded. If the air which is brought into the cylinders is dusty, these foreign particles work their way around the pistons and piston rings acting as an abrasive. Wear results. Dirt also works down into the oil pump where it mixes with the lubricating oil. Sludge forms in the oil pan. This thick, heavy mass of oil and dirt collects around the oil strainer, clogging it and retarding the flow of oil through the lubricating system. Sometimes it so decreases the flow of oil that the bearings are not properly lubricated with the result that they burn out. It will be seen that dust has a disastrous effect on the engine as a whole. Not one part but all are affected. Repair bills become evident. The engine becomes an expense rather than an investment.

Production of Clay in 1925 Exceeded 1924

The quantity of clay sold by producers in the United States in 1925 amounted to 4,030,420 short tons, valued at $12,736,632, or $3.16 a ton, according to a statement made public by the Bureau of Mines, Department of Commerce. These figures show an increase of 9 per cent in quantity and 11 per cent in value compared with 1924. They represent only clay sold as clay or mined under royalty and do not include the much greater quantity of clay that was burned into clay products by the producers themselves from their own property. The data were collected direct from producers in 43 states and in cooperation with the State Geological Surveys of Alabama, Florida, Georgia, Illinois, Iowa, Maryland, Michigan, Missouri, New Jersey, New York, North Carolina, Texas, Virginia, Washington, and Wisconsin. The leading five States in the order of the quantity of clay sold were Pennsylvania with 19 per cent of the total quantity, Missouri with 11 per cent, New Jersey with 9 per cent, and Georgia and Ohio with about 8 per cent each.

The sales of kaolin, the clay that is used in making high-grade pottery and porcelain, as well as paper, oilcloth, and other products, and which is generally considered the highest grade of clay, amounted to 367,319 tons, valued at $3,220,719, an increase of 12 per cent in quantity and 10 per cent in value as compared with 1924. The clay of largest quantity and value is fireclay. The sales of fireclay in 1925 were the largest ever recorded —2,566,934 tons—and were 5 per cent greater than those of 1924, the year of largest output previous to 1925. The value of the fireclay sold in 1925 was $7,312,349, an increase of 9 per cent as compared with 1924 and an increase of 3 per cent as compared with 1920, the year of greatest value of fireclay previous to 1925. The sales of clay of every kind increased in quantity and value in 1925, as compared with 1924.

The imports of clay decreased in quantity and value and the exports increased in quantity and value in 1925, as compared with 1924. The imports of clay amounted to 436,815 short tons, valued at $3,832,225, a decrease of 2 per cent in quantity and 4 per cent in value. Exports of clay in 1925 amounted to 83,043 tons, valued at $881,566, an increase of 14 per cent in quantity and 20 per cent in value, as compared with 1924. Kaolin, or china clay, constituted 85 per cent of the total imports in 1925. Fireclay, the principal clay exported, amounted to 53 per cent of the total.

Clay Sold by Producers in the United States in 1924 and 1925

	1924		1925	
Kind	Short tons	Value	Short tons	Value
Kaolin	326,611	$2,923,965	367,319	$3,220,719
Ball Clay	83,034	581,966	109,607	699,427
Slip Clay	5,910	31,023	7,349	37,397
Fire Clay	2,443,710	6,737,063	2,566,934	7,312,349
Stoneware Clay	59,194	117,142	77,438	162,161
Miscellaneous	772,660	1,116,377	901,773	1,304,579
	3,691,119	11,507,536	4,030,420	12,736,632

New Incorporations

West Virginia Cement Co., Wilmington, Dela. Capital, $2,525,000. (Delaware Registration Trust Co.)

Chenango Valley Sand and Gravel Co., Sherburn, N. Y. Capital, $30,000. Incorporators: J. F. and E. S. W. Paddleford, H. V. Ownens. (Filed by W. N. Truesdail, Norwich, N. Y.)

Stucco-Cell Building Corporation, East Bound Brook, N. J. (Building Materials, etc.) Capital, $20,000. Incorporators: Algar John Ewald, New York City; Albert H. Birdsall and Albert M. Birdsall, Bound Brook, N. J. (Atty. John P. Cullen, Bound Brook, N. J.)

Long Beach Sand Co. Capital, $200,000. Incorporators: M. Ankin, R. Moore, R. E. Tinsley. (Filed by Schlesinger & Krinsky, 299 Broadway, Manhattan, N. Y.)

Atlantic Concrete Products Co., Buena, N. J. Capital: 1000 shares, no par. Incorporators: C. E. A. Engleman, C. Swenson, F. Vanderborgh, Buena, N. J.

Patuxent River Sand and Gravel Co., Dover, Dela. Capital, $100,000. (Capital Trust Co. of Delaware.)

Lee Lime Corporation. Capital, $800,000. (Mine and quarry lime and other minerals and ores.) Incorporator: E. E. Craig, Dover, Delaware.

Farrell's Monument Works, Paterson, N. J. Capital, $100,000. Incorporators: Reuben H. Reiffin, Herman D. Edelson, Jeanette M. Petrie, Paterson, N. J. (Atty. Reuben H. Reiffin.)

Baylor Marble and Tile Co., Inc., Oklahoma City, Okla. Capital, $100,000. Texas agent: R. W. Mack, Breckenridge, Tex.

Standard Asphalt Company of Florida, Cincinnati, Ohio. (Construction.) Capital, $300,000. (American Guaranty and Trust Co.)

Young and Lerman (monuments). Capital, $12,000. Incorporators: E. Newman, P. and S. Lerman. (Filed by B. Levy, 179 East Broadway, New York City.)

K. H. Talbot Joins Cowham as Cement Sales Manager

Announcement has recently been made of the appointment of K. H. Talbot as manager of cement sales of the Cowham Engineering Company. This company are designers, builders, and operators of portland cement plants. They act as managers and operators for the three plants of the Consolidated Cement Corporation located at Cement City, Michigan; Fredonia, Kansas; and Mildred, Kansas.

The Cowham Engineering Company is now constructing for the Florida Portland Cement Company a 1,500,000 barrel plant at Tampa, and has recently announced the construction of a plant at Rockland, Maine, to begin in the near future. The combined output of the present operating plants is approximately 4,000,000 barrels. With the completion of the plants now being built and contemplated this will be increased to 6,500,000 barrels, making the Cowham chain one of the largest in the country.

Mr. Talbot was formerly with the Centrifix Corporation of Cleveland. Prior to this he was connected with the Koehring Company at Milwaukee and the Universal Portland Cement Company at Pittsburgh and Chicago.

New Mundy Distributors

The Mundy Sales Corporation announces the following new exclusive distributors for the entire Mundy line. Bacon Engineering Sales Company, 254 Erie Building, Cleveland, Ohio. Barnett-Dunning, Inc., 143 E. Ohio Street, Indianapolis, Indiana, and the Toledo Sales and Engine Company, 16 North St. Clair Street, Toledo, Ohio.

Natural Abrasives Produced in 1925

The total quantity of natural abrasives sold by producers in the United States in 1925 was about 194,000 short tons, valued at over $4,000,000, according to a statement made by the Bureau of Mines, Department of Commerce, and compiled from individual reports furnished by producers. In addition, there were manufactured and sold during the year 88,530 short tons of artificial abrasives, valued at $7,988,930.

NATURAL ABRASIVES SOLD BY PRODUCERS IN THE UNITED STATES, 1924-25

Abrasive	1924 Short tons	1924 Value	1925 Short tons	1925 Value
Diatomaceous earth	63,163	$693,917	73,030	$922,281
Emery	2,195	19,756	769	5,907
Garnet	8,290	674,176	8,429	712,853
Grinding pebbles and tube-mill lining	2,532	37,429	3,831	50,147
Grindstones	28,991	852,260	28,970	864,637
Millstones, chasers and dragstones	(a)	30,125	(a)	22,490
Oilstones, whetstones, hones, scythestones, and rubbing stones	1,056	258,943	970	272,224
Pulpstones	9,193	814,409	8,370	841,302
Pumice	43,651	190,253	40,380	179,020
Tripoli	28,476	389,409	29,388	434,886

(a)—Quantity not reported by weight.

New Schaffer Poidometer

The Schaffer Poidometer Company has recently placed a new type Poidometer on the market. This type machine will be sold to handle such material as hot clinker, stone, coke and other sharp and abrasive materials. In place of the rubber belt and pulleys this machine is equipped with cold rolled steel flights mounted on two strands of high grade 1 inch pitch steel roller chain, which operates over cut tooth sprockets.

The Lehigh Portland Cement Company has two of these new type machines handling hot clinker, one in their plant at Sandts Eddy, Pa. and the other one in their Alsen, New York plant. The Coplay Cement Manufacturing Company has five of these new type Poidometers handling hot clinker, gypsum and stone in their plant at Coplay, Pa. The Lehigh Portland Cement Company has just ordered another one of these new type 36 inch Poidometers for handling limestone at their Mason City, Iowa, plant.

These machines are manufactured in two widths. The 20 inch width has a capacity of 40 tons per hour on such materials as stone and clinker, provided it is crushed to 1½ inch and finer, and the 36 inch width has a capacity of 150 tons per hour on the same material, provided it is crushed to 4-inch and finer. The new type Poidometer as well as the old type are now being equipped with a new style Productimeter mounted on the side of the hopper, which gives the operator a clearer view of the amount of material handled in any given unit of time.

New Time Relay Designed

A definite time relay for operation on direct-current circuits has been designed by the General Electric Company. This is made in two forms, designated as type MC-12, one for 115-volt operation and the other for 230 volts. The new relay is designed to operate within a range of from 5 seconds, minimum, to 35 minutes, maximum. An extra lead is brought out through the enclosing case for connecting to the necessary resistor. A resistor mounted inside the case is connected in multiple with the motor armature to give constant speed.

New General Electric Welding Apparatus

The General Electric Company has recently introduced apparatus and accessories to be used with automatic air welding machines. In bulletin GEA-452 is illustrated an automatic air welding head and control. The head incorporates the necessary mechanism for feeding the electrode to the arc and consists essentially of a pair of feed rollers geared to a small variable speed direct current motor. The feed rollers draw the wire from a reel through a guide and feed it through a nozzle to the welding arc. The nozzle is easily removed by unscrewing, and the distance and pressure between the feed rollers is readily adjustable.

The motor which drives the feed rolls is a 20 volt shunt wound motor, The motor speed is reduced to the lower speed of the feed rollers through a gear train. The gear train includes a selective gear changer whereby the gear ratio may be altered at will to adapt the speed of the feed rollers to the size of the wire and the welding current being used.

The control equipment includes a CR-4909 control panel, a CR-2909 meter panel consisting of a volt meter and ammeter mounted on slate base, and a CR-2940 "stop-start" push button station. Supports for the welding head and control have also been designed so that either straight or circular seams may be welded successfully.

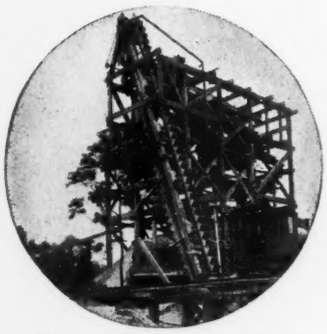
Another type of semi-automatic welding apparatus is described in bulletin GEA-453. This equipment consists of a welding head, jib-crane and tank rolling device. This equipment was designed for use in welding the circumferential seams on tank or similar work. This development has been made to many requests for a device which will permit of the proper and convenient use of semi-automatic air welding equipment.

The jib-crane mounting gives the desirable support and at the same time allows a reasonable radius of operation and keeps the current cable from the floor. The crane swings on a radius of 8 feet 6 inches and the cable is 15 feet long. Therefore, all points within a radius of approximately 20 feet can be reached. A block and tackle or chain fall may be attached to a post or the wall of a building, the jib-crane forms a support for the semi-automatic welding head and flexible cable. A reel support for the electrode wire is mounted on the crane. The control panel and meter panel are designed for mounting on the wall within reach of the operator.

Complete Equipment for Sand and Gravel Washing Plants

Link-Belt "Built for Service" Crawler Crane operates as Crane, dragline, dipper shovel, trench shovel, etc. Shown operating with dipper shovel on a stripping job.

The Belt Conveyor — most effective means of conveying raw and washed sand and gravel. Furnished with >MULTIROLL<, Anti-Friction, or>UNIROLL< carrying idlers



Three general types of bucket elevators are adaptable to the work of raising materials at gravel washing plants:

1. Continuous bucket elevator.
2. Centrifugal discharge elevator.
3. Digging elevator.

Continuous bucket elevator illustrated. Send for details

FROM stripping the overburden with a Link-Belt Crawler or Locomotive Crane, to the delivery of properly sized and thoroughly washed sand and gravel through gates to the cars for shipment, Link-Belt equipment efficiently performs every operation.

Each installation is designed and built to fit the individual conditions and requirements.

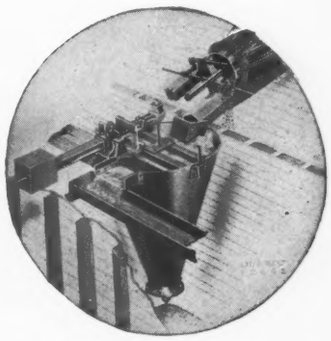
Sound engineering, a careful selection of those materials that go to make Link-Belt equipment for sand and gravel plants, and the fact that the machinery is built in our own shops, under the supervision of our engineers, have guaranteed for Link-Belt machinery successful performance and long life.

Our engineers stand ready to help you solve your sand and gravel handling problems. Send for a copy of our Book No. 540.

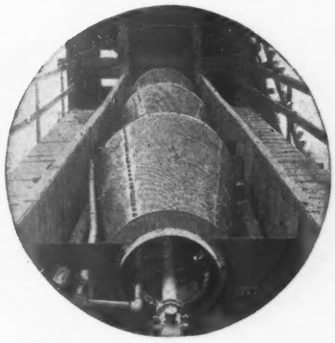
2552-A

LINK-BELT COMPANY
Leading manufacturers of Elevating, Conveying and Power Transmission Machinery
PHILADELPHIA, 2045 Hunting Park Ave.
INDIANAPOLIS, 200 S. Belmont Ave.
CHICAGO, 300 W. Pershing Road
Offices in Principal Cities
LINK-BELT MEESE & GOTTFRIED COMPANY
San Francisco, 19th and Harrison Streets
Oakland, Calif., 526 Third St.
Los Angeles, 400 E. Third St.
Fresno, Calif., 215 Brix Bldg. Seattle, 820 First Ave S.
Portland, Ore., 67 Front Street

The Link-Belt Dragline Cableway Excavator — a shovel, conveyor and elevator all combined in one unit, operated by one man. Low in first cost and maintenance



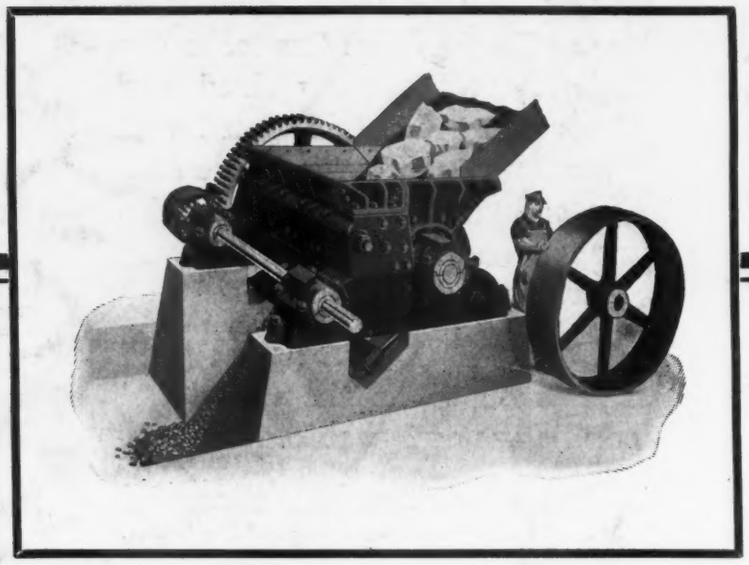
Link-Belt Automatic Sand Separator. One of the most important units in a washing plant. Only by the use of this separation can sand be delivered clean and free from impurities



Link-Belt Conical Screen—materials are fed into large end and travel toward small end. This is logically the proper method, because principal work takes place at large end

LINK-BELT

"STEVENSON" *Built* Single Roll Crushers



Quantity Production Quality Product

Two essentials that every operator looks for in his crushing equipment. Is it interesting to you to know that "Stevenson" Built Single Roll Crushers insure greatest possible tonnage at least expense for maintenance and labor to operate?

If so, drop us a line. Our engineers can meet your requirements.

THE STEVENSON COMPANY

WELLSVILLE, OHIO